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Battelle Technical Review

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The Electric Furnace—Creative Inferno

HIGH-TEMPERATURE SCULPTURING

This sculptured effect was created in an aluminum-oxide specimen by a high-velocity, high-temperature flame in the course of a ceramic study. An examination of the ripples left in the molten material reveals the pattern of the flow of the hot gases.

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BATTELLE TECHNICAL REVIEW

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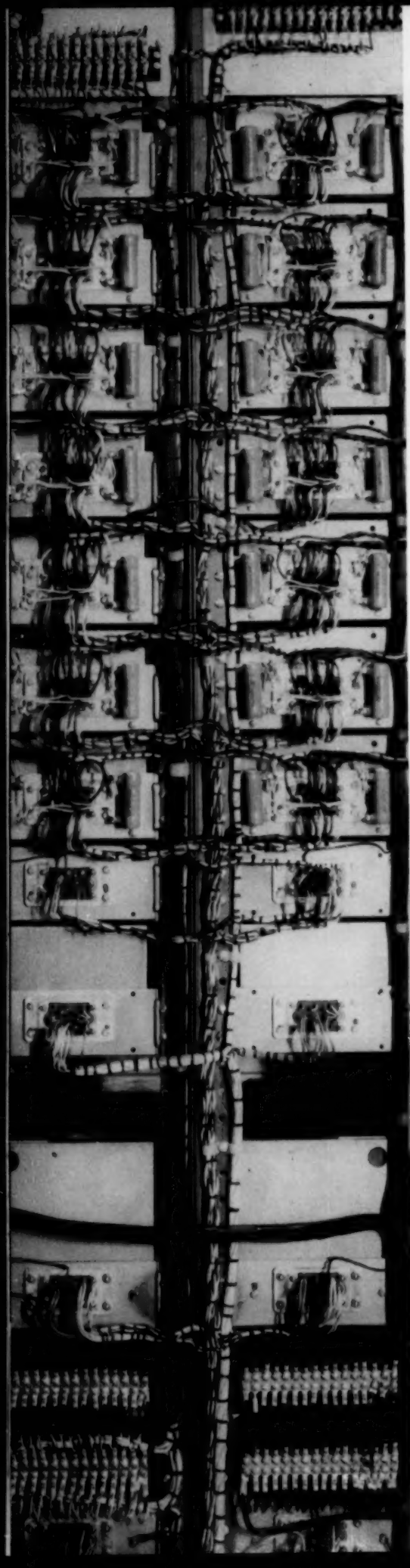

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VIGNETTE

PHYSICIST

H. R. Nelson

Appointment to the Atomic Energy Advisory Board of the State of Ohio (the country's first such state board) was a "natural" for H. R. Nelson. As manager of Battelle's department of physics, one of his major responsibilities has long been the guidance of the Institute's extensive atomic energy research program. "Hap", as he is known to his colleagues, serves also as a member of the Atomic Energy Commission's Advisory Committee on Isotope Distribution.

Hap came to Battelle from Cornell University where, in addition to teaching, he had received his Ph.D degree in physics. As an outgrowth of his special interest in electron diffraction, he had built, while there, an electron diffraction camera for studying metal surfaces, the first such camera in America. His undergraduate degree in physics and philosophy was earned at Amherst College. At Battelle, Hap immediately found ample opportunity to apply his knowledge in widely diverse studies—surface physics and chemistry, solid state, and electron and X-ray diffraction. All of these were largely new ventures at Battelle in fields that were to grow in importance.

With the coming of World War II, his scientific knowledge and experimental skill were applied in opening still other research areas, including vacuum-fusion and gas-metal studies and research in physical electronics. Although he is no longer directly involved with many of the activities he helped introduce, Hap still directs a number of them. Included in his department of physics are the Institute's physical-measurements facilities, the mathematical group which carries on analytical studies in all research fields, and its research in X-ray and electron diffraction and microscopy.

His involvement initially in atomic energy research, as Hap explains it, came about because physicists were identified with all phases of the work. In any event, as the research load grew, his responsibilities grew also. Currently, his group is concerned with all aspects of reactor technology relating to design and engineering, components, shielding, fuel elements, and control devices. He also plays a key role in the administration of Battelle's atomic energy facilities and with research programs utilizing them.

Hap retains active membership in the American Physical Society, the American Nuclear Society, and the American Acoustical Society. He appears as author on a score of published papers.

Along with their daughter and son-in-law, Hap and his wife, Helene, are rejoicing over the event which has just made them grandparents. We suspect that this event, for the moment, overshadows the activities of their son, a university senior. To Hap, relaxation means sailing, with painting in oils a substitute until the weather breaks.

SCIENCE AND MAN'S UNDERSTANDING

"Our great problem and opportunity now are to let science be its true self and thus realize its full potential for good. We live in a period marked by both subtle and gross assaults on intellectual life. The whole domain of science has been represented as endangering man's noble aims and ends.

"In the face of the practical responsibilities which rest in science for our security and our material welfare, it is all too easy for people to become bemused by the sophistry that science is inimical to the spiritual ends of life and for them to fail to understand that instead, it is one of man's most powerful and noble means for searching out truth and augmenting man's dignity by augmenting his understanding.

"Scientists have an obligation to make this true character of science better understood and to do so, not by arrogant advocacy of science and technology as the only means to increase our understanding and wellbeing, but by the balanced and tolerant presentation of the scientific spirit as one of the great and powerful methods by which man can increase his knowledge and understanding and still remain humble and ennobled before the wonder and majesty of what he does not understand."

—**James R. Killian, Jr.,** President, Massachusetts Institute of Technology and Scientific Advisor to the President of the United States.

The Electric Furnace--Creative Inferno

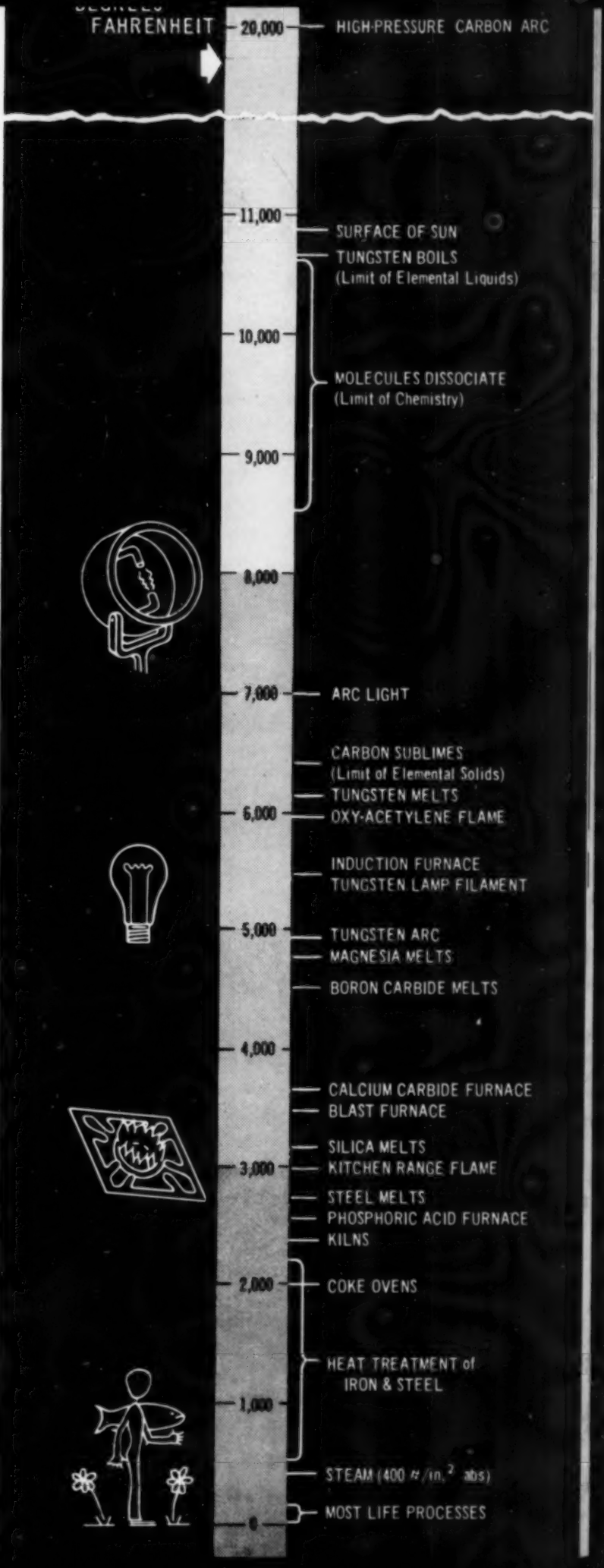
by N. H. KEYSER

The various types of electric furnaces supply industries with flexible, convenient, and efficient sources of heat. The author reviews their utilization in both the metallurgical and chemical industries and suggests areas where electric furnaces may be used effectively in the future.

A RECENT ADVERTISEMENT listed 60 electrical conveniences at work in your home and mine. These appliances ranged from items which we have come to accept as absolute necessities (such as electric lamps) to electrical hobby equipment that makes our leisure time more pleasant. For many years, industry has put electricity to work in a formidable list of ways to make easier the job of converting basic raw materials to the multitude of products we need to raise, maintain, and protect our standard of living.

Industry uses a great variety of motors and machines in its factories. One of the most impressive and useful of these is the high-temperature electric furnace which eats up huge quantities of electrical energy. One of the largest electric-furnace plants, for example, has been reported to consume electricity at about the same rate as a city of over a million inhabitants.

Because the electric furnace is a flexible, convenient, and efficient source of heat, it is found at work in many kinds of chemical and metallurgical processes. Practically any operation that requires heat to promote



The tremendous temperature range of the electric furnace is revealed in the accompanying scale. In its varying forms, the electric furnace is capable of providing heat up to and exceeding the surface temperature of the sun.

physical or chemical changes can be carried out in an electric furnace of one kind or another. Because of its distinctive advantages, electricity has no competition from other types of energy in many processes. In other cases, electricity may compete with flame heat from fuels such as coal, coke, or natural gas.

An important reason for the use of electrical heating in the manufacture of many chemicals and metals is that it provides large quantities of heat at high temperatures which cannot be attained and sustained economically in any other way. New techniques (such as high-arc pressures) are reported to produce temperatures of 20,000 F, or more. At the extreme high temperature attainable, molecules no longer exist. All compounds break down into ions. The intensity of the heat attainable by electric furnaces may be appreciated from a study of the chart on page three.

Basic Types of Electric Furnace

The electric furnace has developed into three general types: arc furnaces, resistance furnaces, and induction furnaces. Each has its particular advantages and characteristics.

Arc Furnaces

Arc furnaces generate heat by means of an electric arc passing between two or more electrodes. One of the electrodes is usually the material that is being heated. The other is usually a material which will stand up at high temperatures and will carry an electric current. Carbon is an example of such an electrode material. The temperature of the arc varies with the nature of the materials present in and around the arc, and with the pressure on the arc. For a carbon arc at atmospheric pressure, the temperature is usually about 6000 F. The largest high-temperature, high-production melting and reaction furnaces are generally arc furnaces. These furnaces produce ferrous and nonferrous metals, calcium carbide, phosphorus, and many other products. Arc furnaces which use standard frequency (60 cycle) current have been limited in size only by the availability of transformers of adequate size. The largest furnaces in use today are backed with up-to-44,000 kva of transformer capacity. In one hour, such a furnace uses enough electricity to keep a typical home supplied with electricity for six to 20 years.

Resistance Furnaces

The resistance furnace takes two basic forms. In one, heat is generated by passing electricity through an external resistor, as is done in the common electric toaster. Temperatures are limited to the temperature that the resistor can stand. Hence, resistance furnaces which use external resistors are generally restricted to low-temperature applications such as the heat treating of metals, or to the melting of some relatively low-melting nonferrous metals and alloys. Increase in capacity is generally handled by a multiplicity of heating elements. Multiple heating elements will not, however, increase the maximum temperature available.

In the second form, used in some applications (such as in the chlorination of titanium oxide, or in the production of silicon carbide or boron carbide), the charge contains sufficient carbon to carry an electric current. Here it is practical and efficient to utilize the charge itself as a resistor to operate a resistance furnace. Heat is generated by the electrical resistance of the charge. Temperatures in such cases are limited only by the amount of electricity that can be passed through a given space, or by the temperature at which the materials in the charge boil away.

Induction Furnaces

The induction furnace induces or generates electric currents directly in the material to be heated. Resistance of the material to this induced electricity generates the heat exactly where wanted, that is, in the material itself. Temperatures attainable are limited only by the properties of the refractories used to construct the furnace.

Induction melting furnaces are used primarily for the melting of high-quality metals. Because of the need for expensive high-frequency converters, only a few such furnaces have been built with capacities over eight tons. High-frequency motor-generator sets with outputs up to 3500 kw are in use. Induction furnaces have definite advantages in small sizes where a high

N. H. Keyser has studied electric-furnace technology from various aspects. He has participated in the development of special furnace designs. He has been associated with research on electric-furnace smelting of pig iron, and he has investigated steel-melting practices in electric-arc furnaces. Keyser has also conducted studies on the melting and casting of ferrous and nonferrous metals, foundry problems relating to core and molding sands, and the electric-furnace processing of materials such as calcium carbide and ferroalloys. These and other research activities have been the bases for a number of previous papers and articles by the author.

level of control is essential. Commercial furnaces operate at about 900 to 80,000 cycles per second.

Because induced high-frequency currents hug the surface, the surface of steel parts can be heated above the temperatures of recrystallization without appreciably affecting the core of the piece. This principle is widely used in industry to impart a hard wear-resistant surface layer on gears that have been machined in a soft condition.

Electric-Furnace Steel

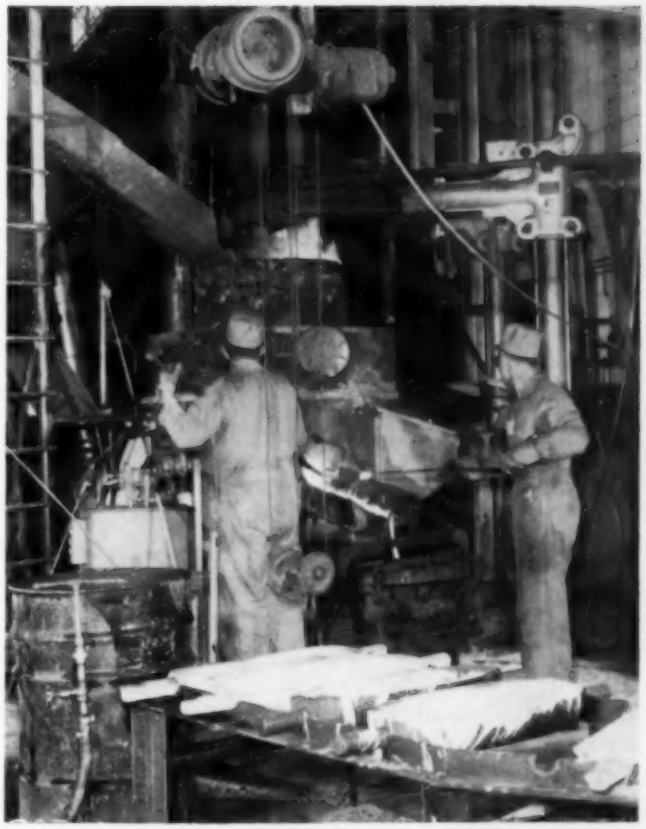
The first heat of electric arc-furnace steel in America was poured on April 5, 1906, by the Crucible Steel Company of America. Since that time, use of the electric furnace for melting steel has grown tremendously. At first, growth was limited to specialty and high-quality steels, and to foundries. Today, electric-arc furnaces have become a major factor in the production of high-tonnage carbon steels, and are used regularly to melt up to 200 tons of steel in one heat or batch.

Traditionally, the electric steel furnace has depended on a plentiful supply of steel scrap. Much research is being carried on today to develop scrap substitutes from virgin ore. Also, there is much work being done to develop practices and furnace designs that will permit the use of large quantities of molten pig iron from the blast furnace (or, perhaps, in the near future, pig iron produced in electric furnaces). Unprecedented growth of the electric furnace is predicted for the day when it is no longer limited by the supplies of scrap.

Electric-Furnace Pig Iron

Pig iron has been produced in electric furnaces for many years in parts of the world where hydroelectric power is available in abundance and where there are no domestic sources of coking coke. Because of the relatively high cost of electricity, conditions have not been favorable in the United States for electric smelting of iron. This condition is expected to change soon.

Small producers of steel, as well as large foundries, often need an independent source of 100 to 500 tons of pig iron per day. These companies have stimulated or supported investments in research to develop attractive pig-iron processes which utilize the electric-arc furnace. Several new electric-furnace pig-iron processes have been developed to the point that they are now undergoing pilot-plant trials. These processes are characterized by a need for only half the electrical energy required by the conventional pig-iron furnace.



This versatile arc furnace is used for pilot studies on the melting of steel, smelting of ores, manufacture of ferroalloys, and the preparation of numerous nonmetallic products. It is powered by a multivoltage 500 kva transformer.

In addition, considerably less capital investment is required as compared with blast furnaces of equal capacity. Some circumstances in the United States even now look favorable for the new electric-furnace pig-iron processes.

Smelting of Ferroalloys

Our present ready availability of stainless steels, high-strength steels, and other specialty steels could not have been possible without the large supplies of chromium, manganese, silicon, and other alloying elements in the form of ferroalloys that are produced in electric smelting furnaces. Nearly every element that is used to alloy iron and steel is regularly won from its ore by processes which utilize electric furnaces. In many cases, a single electric furnace produces the finished ferroalloy directly from the ore. In other cases, the electric furnace serves only as a concentrating step in a complex process or as one in a series of units required by a process.

A new method for producing electrolytic chromium metal shows how an electric furnace can be used as a

chemical vessel in combination with more familiar chemical processes. The method has made electrolytic chromium competitive with less-pure forms of chromium metal. In the new process, high-carbon ferrochromium is produced in an electric-arc furnace. The electric furnace concentrates the chromium in the alloy, and eliminates a major portion of the impurities as a slag. The beneficiated material can be dissolved readily for electroplating of the chromium.

Electric Furnace in Complex Processes

The production of zirconium provides an example of the use of electric furnaces to perform several functions in a multi-step chemical process. Production starts with the treatment of a mixture of zircon (zirconium silicate) sand and coke breeze in an electric-arc furnace. Most of the silicon is driven off with the top gases. The furnace therefore, acts as a beneficiating or concentrating vessel. The zirconium is recovered as a crude zirconium carbide which is reacted with chlorine in an unheated, water-cooled retort. The resulting zirconium chloride is placed with magnesium in closed retorts which in turn are heated in vertical resistance-type electric furnaces. The retorts operate under partial vacuum to sublime the chloride to react with the magnesium. After the reaction is completed, the retort is opened and the crude zirconium sponge is removed.

The zirconium sponge (which contains undesirable magnesium chloride from the reaction) is then transferred to another retort. The top of the retort is heated by removable resistance-type electric furnaces, and its bottom is water jacketed. By proper manipulation of temperature and vacuum in the chamber, most of the magnesium chloride is melted and drained from the sponge. This step is followed by the distillation of the remainder of the chloride. The purified sponge is removed and pressed into bars which are used in the production of zirconium ingots. The pressed bars are then melted by using them as electrodes in an arc furnace. Because the arc passes between the material being melted and the pool of metal already melted, there is no contamination from electrodes. To avoid contamination from refractories, a water-cooled copper crucible is used to receive the melt.

Similar processes have been developed for the production of titanium and other unusual or rare metals.

Synthetic Minerals

Recent progress in the commercial production of synthetic mica leads us to believe that our country can become independent of foreign sources of mica in the near future. The synthetic mica is similar to natural mica, but the former has fluorine substituted for the hydroxyl radical of natural mica. As a result, the synthetic mica is more resistant to destruction by elevated temperatures. This improved resistance to thermal failure will increase the dependability and operating efficiency of many electrical and electronic devices.

Synthetic mica was first observed in slags and crucibles. Today, after much research, it is produced commercially by fusing a mixture of silica sand, calcined alumina, calcined magnesia, potassium silicofluoride, and potassium feldspar. Up to 40 tons of mixture is heated to about 2500 F in a specially-constructed electric furnace and then allowed to cool back to room temperature in 10 days or more.

Man-made diamonds are another new product of special electric-furnace research. These diamonds will eventually help to satiate our industry's ever-increasing appetite for abrasives. Synthetic diamonds are a product of high-pressure vessels which are heated electrically. Diamonds from 100 microns to 1 millimeter on an edge have been produced in chambers heated above 3500 F under enormous pressures up to 1½ million pounds per square inch.

The electric furnace is not limited to the synthesis of minerals found in nature. Recent announcements have revealed that boron nitride, normally a soft talc-like mineral, has been recrystallized under heat and pressure to a diamond-hard form which is not found in nature. The electric furnace has been used many years for the production of other minerals that are unknown in nature. One of the best known of the synthetic mineral products of the electric furnace is silicon carbide (a common abrasive).

The fusion of many refractory oxides in an electric furnace has resulted in improved levels of properties which have not been attainable in any other way. The high density of the fused product minimizes the shrinkage that occurs normally when the materials are heated to high temperatures for long periods of time. The development of fused magnesia of high purity, for example, has made possible the reliable, long-lived heating elements in the electric range in your kitchen.

Many fused refractory and abrasive products are refined during the course of their production. Purification may be accomplished by such techniques as the addition of iron and coke for the reduction and absorption of silicon, the addition of sodium chloride or other compounds to aid in the vaporization of certain impurities, or by fractional crystallization.

Special techniques have been developed for the pro-

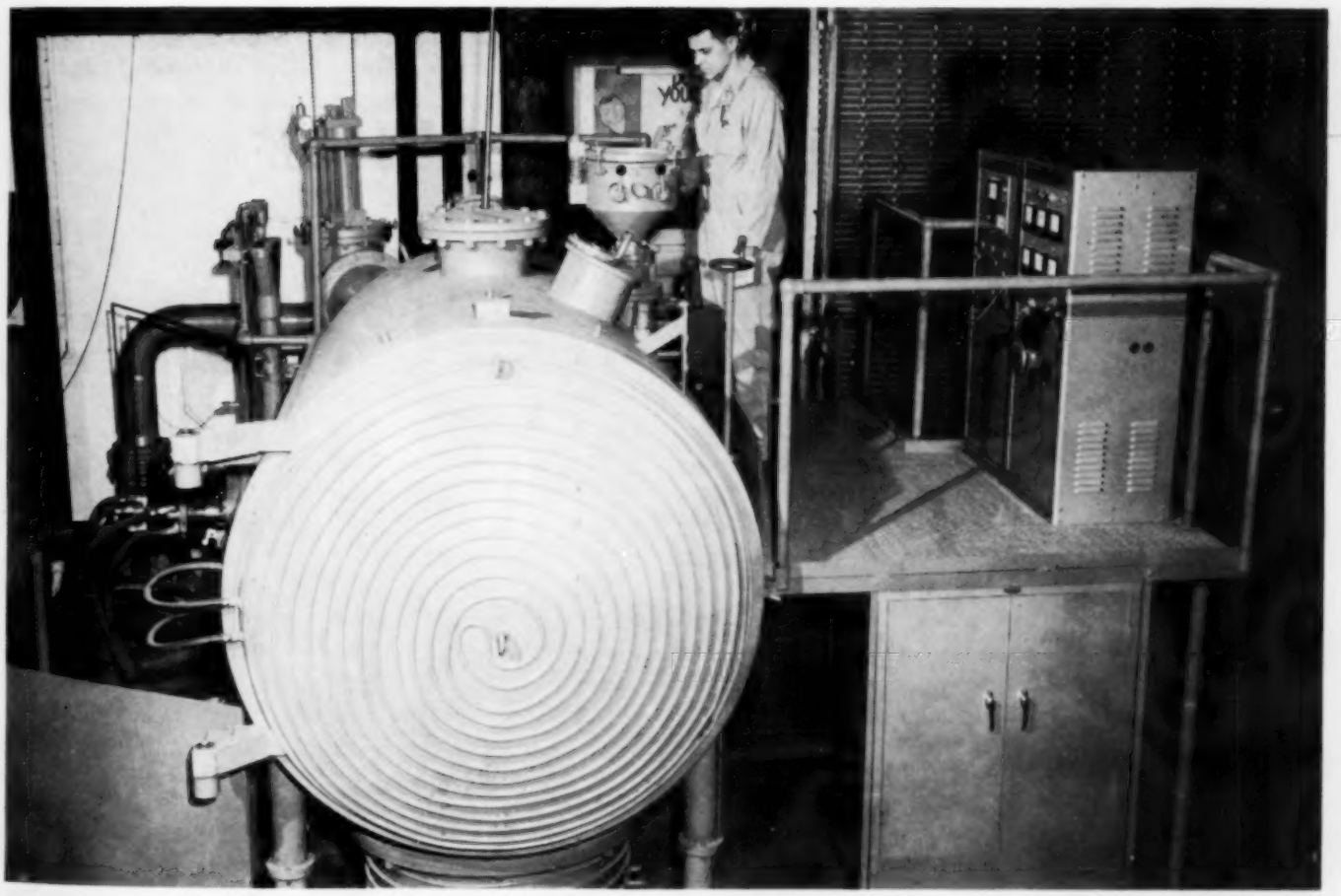
duction of metals with exceptional purity for use in transistors. Induction furnaces are used in these techniques because they are capable of precise control. Magnetic levitation melting uses magnetic forces and induction currents to suspend metals in space and melt them away from any contact with refractory material which could contaminate the metal. Another special technique is called zone melting. Zone melting is actually a fractional crystallization technique. It is capable of producing metals of such high purity that conventional analytical methods are incapable of detecting impurities in them.

The Future

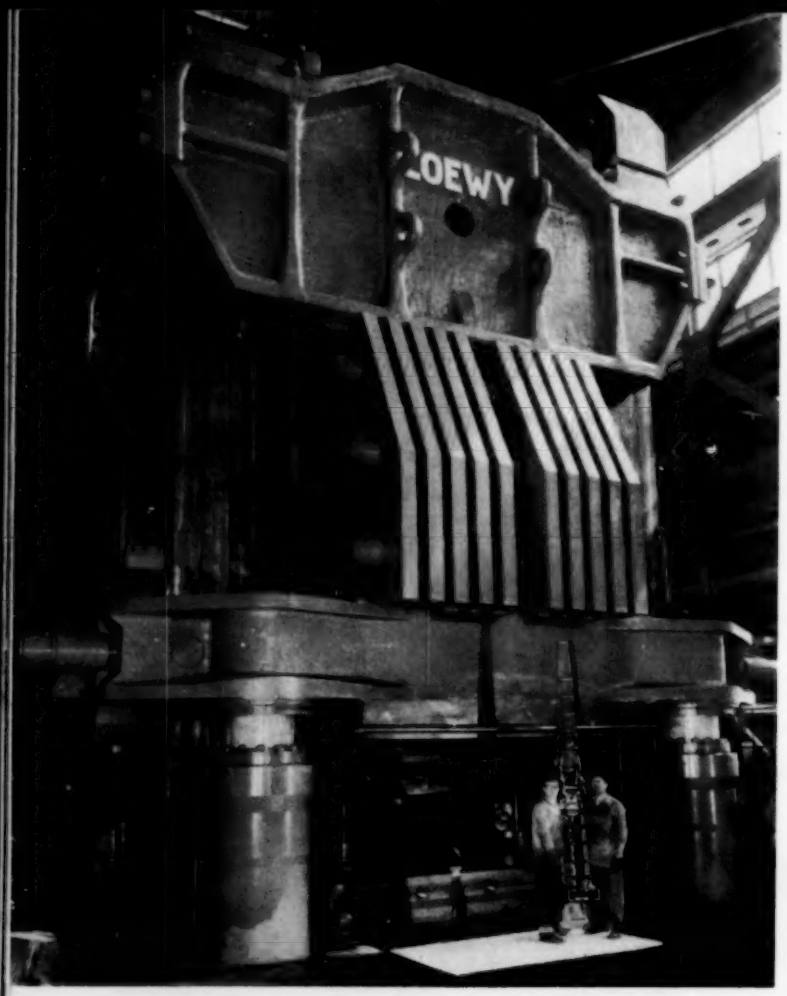
The development of extremely rapid rates of chilling to prevent reversal of desired reactions would open all sorts of new fields for the electric furnace. For example, aluminum oxide can be heated to sufficiently high temperatures in a reducing atmosphere to produce aluminum metal. If this metallic aluminum could be cooled with its co-product carbon monoxide without reverting to aluminum oxide, a way might be opened for obtaining cheaper (and, perhaps, better) aluminum for pots, planes, automobiles, and space ships.

There will be much new research on the heat of dissociation of molecules. These data will be used to make predictions of chemical equilibria and rates of reaction thus opening vistas of many intriguing new possibilities. The high-temperature chemist will find opportunities to use this knowledge to develop products of commercial interest.

New developments now in the laboratory will continue the trend of recent years of replacing old batch processes with new continuous processes. Such, for example, has been the replacement of batch-type ingot furnaces with modern tapping furnaces in the manufacture of fused refractories. There will, of course, be a continuation of the trends toward larger and larger furnaces to reduce the costs of production. For some specific products, however, market development is needed to justify larger furnaces.



This vacuum induction furnace in the metallurgical laboratory at Battelle is capable of melting from 10 to 300 pounds of metal at one time, and provisions have been made to permit semicontinuous production, when research requires it. An effective vacuum (down to .001 milimeter of mercury, or one micron) can be achieved. The steel vacuum chamber, five feet in diameter and eight feet long, is cooled by a water jacket over the upper one-third of the shell. Copper coils cool the remainder of the shell.



One of the heavy hydraulic presses now being used to forge precision parts for aircraft. The 12-foot wing spar shown in front of the press is one of the larger of such forgings now being made. A photo of the wing spar is shown on the opposite page.

New Developments in Forging

by Homer L. Shaw

The introduction of powerful new presses and new forging techniques offers exciting possibilities for improvement in methods of shaping metals. The author discusses what is already being done and the forging problems yet to be studied.

The art of forging metals was once largely the province of the blacksmith. In its crude beginnings, the process involved the shaping of metal by first heating and then beating it into the desired forms. Today, forging is carried on primarily by shaping pieces through the application of great pressures upon the metal to be formed. In the period since World War II, forging has advanced with giant strides under the impetus of the needs of the makers of aircraft and missiles. To satisfy these needs, huge presses with capacities of 50,000 tons have become available. To keep up with the expanding forging program, metallurgists have had to investigate methods for making effective use of the new equipment.

Prior to World War II most of the production forging equipment consisted of steam or air-operated hammers along with a smaller number of mechanical presses which receive their energy from a heavy rotating fly wheel. Presses of these types using closed dies, had been used for years in producing fairly small parts such as engine components and hardware from steel. Drop hammers of 20,000- to 40,000-pound capacity were adequate. Equipment and methods used for forging steel were also used in producing forgings from the light alloys of aluminum and magnesium. Parts produced were not only relatively small but had wide dimensional tolerances. They were usually shaped so as to be machined readily to final dimensions.

The development of the jet engine, following World War II, brought with it increased demands for far greater strength and rigidity in airframe structural sections. New conditions of flight at sonic or supersonic speeds called for thinner swept-back wing sections requiring greatly increased wing loading. The many mechanical joints of a thin skin riveted to a built-up skeleton could no longer be tolerated. The wing skin had to serve as a structural component as well as to function aerodynamically to produce lift. Because of the higher wing stresses it was necessary to use the fewest possible number of mechanical joints in the built-up sections in order to minimize fatigue. Attaching the new type of wing to the fuselage also

became very difficult. Very large aluminum or magnesium alloy forgings were required for internally joining the large wing-supporting sections to similar sections of the skeleton of the fuselage. The feasibility of using large forgings for such purposes was proved by German aircraft makers during World War II.

Heavy Presses

Since late in 1955, seven heavy, closed-die hydraulic forging presses, with capacities ranging from 8,000 to 50,000 tons, have been in operation in the United States. They have been largely devoted to producing components for aircraft, though other applications have also been made. Producers are making considerable effort to utilize the potential of heavy forging presses in all fields.

Since the majority of the heavy presses were supplied by the United States Air Force, most of the work done has been directed toward advancing aircraft design. Newer high-performance aircraft require the greatest possible structural strength with minimum weight and bulk. The heavy presses are capable of producing the necessary structures with a high strength-to-weight ratio, at relatively low cost and in production quantities.

Through close cooperation between the forgers and aircraft designers, many improvements in design and forging techniques became possible. By redesigning, certain sections of modern aircraft have been combined into one piece, which has saved many man-hours in assembly. For example, a 12-foot long aircraft wing spar has been produced on one of the 35,000 ton forging presses from an aluminum alloy (see pages 8-9). The section is 18 inches at the widest point and 3/16 inch at the thinnest point. Four of these forgings are required for the Convair F 102, a delta-wing, supersonic interceptor. The forgings replace 272 parts and 3200 rivets, saving 100 pounds as compared with conventionally fabricated spars. Also, the forged spars require a minimum amount of machining.

Conventional forging methods used dies having generous draft angles and fillet radii and reasonably thick webs and flanges. In addition, fairly wide dimensional tolerances were necessary. Because of these factors, a considerable amount of machining time was required before the part could be placed in assembly.

The heavy-press closed-die forging techniques have been advanced to a point where draft angles and fillet radii have been reduced or eliminated (see page 11). Also web and flange sections have been made thinner, approaching theoretically designed structural shapes, and dimensions are held to close tolerances. A support forging produced for the McDonnell F-101 exemplifies the savings from such techniques. In this example, 30 pounds less forging stock was required than for the same forging made by conventional means. In preparing for assembly, only two pounds of material had to be machined from the forging as compared with the 23 pounds that were necessary when forging by conventional methods. Resultant savings in machining costs amounted to about 20 per cent, while savings in material costs totaled about 25 per cent.

The largest aluminum-alloy closed-die forging reported to date was a part for the airframe of the Martin XP6M Sea Master, the first multi-jet seaplane. The canoe-shaped forging was 13 feet long, one foot thick, and three feet across at the widest point. The finished piece, which weighed 3000 pounds, was pressed from a 4200-pound blank of X7079 aluminum alloy by a 50,000-ton hydraulic press. The finished dies for this forging weighed 60 tons even after some 15 tons of metal had been removed in finishing the rough-forged die blocks. The finishing of the dies, of course, required many man-hours.

Photos courtesy of Wyman-Gordon Company

The forging is one of four required for the Convair F 102, a delta-wing, supersonic interceptor. By replacing 272 parts and over 3000 rivets, four such spars lighten the plane by 100 pounds. Moreover, by reducing machining and assembly work the forgings cut the cost of the wing spars.

Cast Dies

Because of the huge quantities of die steel required and the time consumed in sinking the die impressions, die costs alone for some short-run large-size forgings may be well over $1000 per forging. Therefore, an investigation is now under way to determine the feasibility of casting forging dies. An age-hardening beryllium-copper alloy has been investigated for such purposes. Use of a number of trial dies cast from beryllium copper was reported to have cut aircraft delivery time and reduced die costs by as much as 75 per cent compared with a die machined from a steel block. In

addition to reduced die costs and forging lead time, the use of cast forging dies permits other economies. At the end of a production run, the die metal can be melted down for re-use. Instead of storing a heavy steel die requiring much care to prevent corrosion, the press shop need store only the die pattern from which another set of dies could be produced quickly when needed.

Lubricants

The adoption of forging techniques using small fillet and corner radii, thin webs and ribs, small draft angles, and close dimensional tolerances, calls for high pressures. Pressures required for producing forgings with conventional techniques ordinarily range from 10 to 20 tons per square inch. Pressures required for forging when advanced techniques are used, however, range from about 30 to 40 tons per square inch.

Considerable work has been done to increase the effective capacities of the presses by reducing the pressures necessary to produce metal flow. Producers generally recognize that very high pressures are needed for press forging parts with thin sections. The factor by which forging pressures exceed the flow stress of the metal being worked depends on friction as well as on the area and thickness of the section involved. Since high friction is undesirable, lowering forging friction by better lubrication would have the same effect as increasing press capacities.

Both water- and oil-based lubricants are used in forging. Laboratory studies on lubricants for forging aluminum have shown that oil-base produced better die filling than water-base lubricants. Operators find it difficult to make water-carried lubricants stick to the dies at temperatures much over 450 to 500 F, particularly if the spray strikes the die surface at an oblique angle. Moreover, technologists have found that higher-viscosity oil carriers with high flash points give better die filling than oils with lower viscosities. Apparently, high-viscosity oils adhere to the hot die surface longer before burning, which permits more efficient deposition of the solid portion of the lubricant.

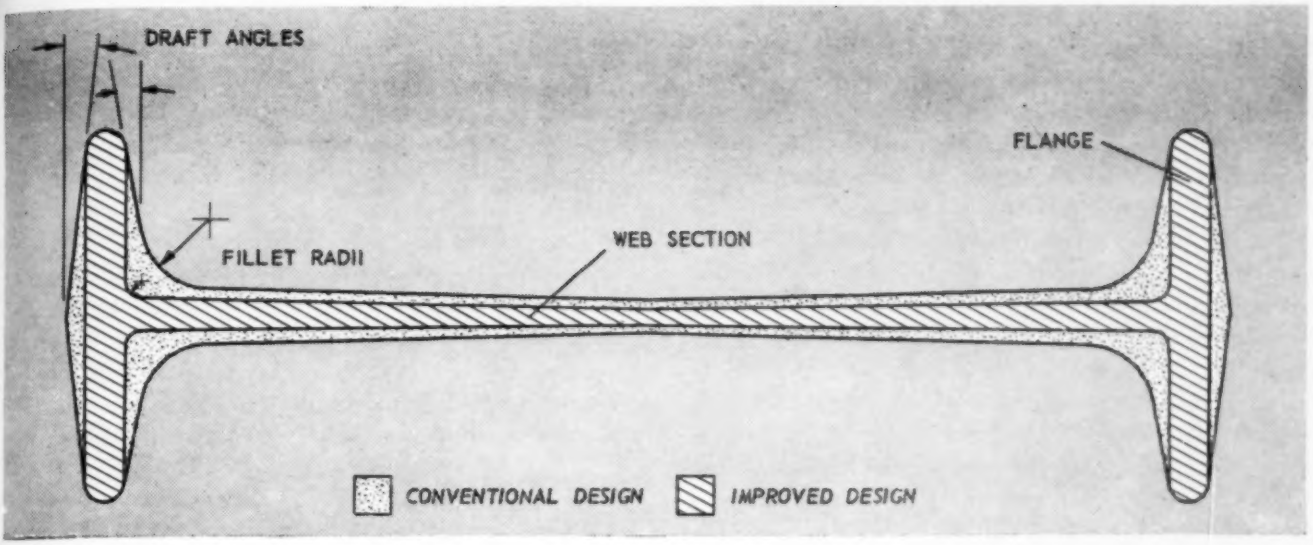
Laboratory experiments have shown that remarkable improvements in die filling may be produced by pretreating the surface of billets before forging them with conventional die lubricants. Technologists found that the best billet pretreatment for aluminum was to etch the surface with sodium hydroxide, then dip it in aqueous colloidal graphite before heating and forging. This produced uniform die filling even when forging with a freshly cleaned die. Untreated billets gave poorer and less uniform die filling when forged with the same lubricant. Data from the study suggested that pretreatment might prevent sticking, metal drag, and poor die filling, all of which account for considerable press down-time in starting a commercial run on clean dies.

When used in a commercial operation, pretreated billets appeared to prevent the sticking and metal drag which occurred with conventionally treated billets. The forging produced was typical of certain airframe components and had thin web sections with deep flanges around the periphery. The dies were of conventional design with a large flash gutter around the periphery of the die cavity. Treated billets appeared to give considerably more lateral metal flow and, consequently, slightly poorer die filling than untreated billets. These commercial tests indicated that with better lubrication, more care is required in order to restrict the metal to the flash trough and to prevent it from spreading beyond the flash cavity. If the metal is not restricted to the flash cavity, the dies cannot close completely and the ribs and flanges will not have the proper dimensions. Perhaps die designs should be varied, depending on the lubricating conditions.

Control of Die Temperature

In addition to the use of better lubricants, many forgers have improved metal flow by proper control of die temperature. The flow strength for most metals decreases rapidly as the metal temperature is increased. Thus, at normal hot-working temperature the stress necessary to produce plastic flow is considerably lower than that at room temperature. The stress necessary to produce metal flow in a typical aluminum

The present article is based upon the author's studies which resulted in two recent technical reports – "Development of Die Lubricants for Forging and Extruding Ferrous and Nonferrous Materials", and "Possible Methods for Improving Forging and Extruding Processes". Since joining Battelle in 1941, Homer Shaw has been associated with studies on the machinability of free-cutting steels. From these studies came the development of the MX machining steels. He has also participated in research on the cold working of metals, lubricant and other aspects of forging problems, and the extrusion of metals. Shaw has reported several of these investigations in previous articles in technical journals.



This sketch of a forged section shows how changes in die and forging design can reduce the weight of a forging by eliminating draft angle, reducing fillet radius, and making thinner web sections.

forging alloy at various temperatures is roughly indicated by the following figures:

Metal Temperature, F	*Flow Stress, psi*
80	40,000
200	37,000
400	27,000
600	12,500
800	7,500

These data show that metal temperature is quite important in governing the pressure necessary to produce plastic flow.

In hydraulic-press forging, the length of time that the dies and workpiece are in contact is considerably greater than in hammer or mechanical-press forging. Therefore, the temperature of the dies used in press forging becomes of considerable importance, especially when working with thin webs and flanges. When relatively thick sections are being worked with dies cooler than the workpiece, the surface of the latter is chilled and a temperature gradient exists between the die-workpiece interface and the center of the section being forged. Chilling the metal raises its strength, and this restricts the metal flow adjacent to the die surface. Most of the metal movement then takes place internally where the metal is hotter and has a lower strength or flow stress.

In thinner sections, where the die is considerably cooler than the workpiece, the whole cross section may be cooled sufficiently to raise the strength level before metal flow starts. Greater pressures are then required to produce flow.

The forging industry is recognizing that cooler dies, thinner working stock, and longer times in contact with cooler dies all act to chill the workpiece and thus raise the pressure necessary to deform the metal. To take advantage of some of the newer forging techniques and forging designs, dies should be maintained at, or approach the temperature of the workpiece. With the present temperature limitations of die materials, this is practicable only for the light metals that are usually worked below 1000 F. Theoretically, the practice of using dies near the working temperatures of the workpieces would be ideal in the hot forging of titanium and steel. Before this is possible, however, die materials that would stand up at the required temperatures and pressures must first be developed.

Die Surface Finish

Operating personnel have suspected that the surface roughness of the forging dies influences the pressure requirements and metal flow in hot forging operations. However, the question of whether very smooth or comparatively rough surfaces permit easier metal flow has not been settled.

Laboratory experiments in small-scale upsetting tests on aluminum alloy have indicated that variations in the die surface roughness can influence the lateral flow of metal in forging operations. The degree to which smoother die surfaces improve lateral metal flow appeared to depend on the effectiveness of the lubricant. With a better lubricant, it was learned, somewhat rougher die surfaces may be tolerated than with a poorer lubricant. With a poor lubricant, extremely fine finishes appeared to be necessary to produce an appreciable improvement in metal flow. In any case, forging pressures are lowered with improved metal flow, however it is induced.

The directional characteristics of the scratches in the die finish may influence the lateral metal flow. Die surfaces finished by hand and having nondirectional scratches produced more lateral flow and resulted in thinner pressings for the same surface roughness and applied load, than those produced by machine and having highly-directional scratches.

The directional characteristics of scratches in dies finished to a surface-roughness value of 80 microinches had a marked influence on the lateral metal flow. Samples pressed with these rough dies were oval in shape. The longer axis of the pressing was parallel to the grooves of the die surface. This indicated that the metal flowed more easily in the direction of the grooves in the die finish. Such behavior might be taken into account in commercial practice for controlling metal movement to a certain extent by planned use of directional die finishing.

Cored Forging

The cored-forging method of producing small parts having holes forged at right angles to each other in one operation has been quite common in Great Britain for a number of years. British producers have used it mainly for making specialty brass plumbing fittings. In 1951, several of the British-made forging presses were installed in this country. They are mechanical in operation and relatively small, having capacities from 60 to 500 tons.

The presses have a top punch in the ram and two side punches actuated by a pitman from the main crank to a lower crank beneath the press bed. The dies are of a split type, closed and locked by vise action of the press. In operation, the heated slug is dropped into the top punch hole just before the upset is made by the coordinated action of all punches.

Many parts, ordinarily produced by conventional solid forging methods, sand casting, or powder metallurgy techniques, may be formed by the cored forging process. Cored forgings are dense and have controlled flow patterns. Moreover, because of the preformed cores, considerable machining time is eliminated, which also results in less loss from scrap. Frequently, both external and internal contours can be produced without draft in the die design to facilitate removal of the punches from the cores and the workpiece from the die. For deep cores in aluminum, one-half degree draft angles are recommended.

Many high-quality aluminum aircraft fittings have been made by the cored-forging process. The operators of cored forging equipment believe the method holds considerable promise for the production of many complex parts. Progress has been slowed because of the limitations of present facilities. The equipment is practically unobtainable in this country and what is available lacks adjustments that the operators believe are necessary. Increased press capacities are also desirable. The confined die area and tonnage of the presses available limit the size of the parts that can be produced to what American operators believe is well below the practical limits of the process. They believe, also, that increased press capacity would benefit the development of cored titanium forgings which is presently under way. Producers think that the cored forging method should be applicable to the production of stainless steel and perhaps other ferrous parts.

Forging Titanium

During the past three years, the techniques for forging titanium and its alloys have been advanced considerably. Experience has taught metallurgists that a much greater pressure is required to forge titanium than to forge an alloy steel. It has been reported that to forge a titanium part in dies previously designed for forging steel, press capacity must be increased by a factor of approximately three. While spreading characteristics of titanium are reasonably good, it resists movement into ribs and bosses.

In order to use available equipment for forging semiprecision and precision titanium pieces, the size of the titanium forging must be limited to two-thirds the size of steel forgings. The dies for the former should be designed with larger draft angles and larger fillet and corner radii than are used in forging steel. Titanium parts should also be designed with slightly greater minimum rib thickness than are ordinarily used in forging steel. Considerable optimism is shown over the future production of larger precision titanium forgings.

With the great amount of development work that has been done in the last decade to improve the methods and techniques of hot forging, the process has evolved from one that was essentially an art into one that is practically a science.

With continuing efforts on the understanding of metal flow in intricate shapes, improving die designs and die materials, and improving lubrication to reduce friction, the available press capacity should be more fully utilized to produce larger and more intricate shapes for military and civilian use at great savings in man hours and materials. In view of the strides made in forging practices in the last few years, with continued research the future possibilities appear unlimited.

NOTES from BATTELLE

* FISSION RECOIL IRRADIATION

Radiation-effects studies on a wide variety of chemical systems are now a major research effort in many laboratories. Radiation-induced degradation, polymerization, and synthesis of both organic and inorganic compounds have been studied. High product yields in some of these systems suggest the possibility of utilizing radiation sources for the commercial production of chemicals. While cobalt-60 and fission-product sources are now widely used to study radiation-induced chemical reactions, they are not, as yet, economically feasible or available in sufficient amounts for many commercial applications of interest. Currently, machine sources of radiation are more practicable for many commercial processes.

In a paper presented before the recent meeting of the American Institute of Chemical Engineers, Battelle technologists Ward S. Diethorn, Paul Schall, Jr., and G. D. Calkins discussed the direct utilization of fission energy for radiation processing. They pointed out that the kinetic energy of recoil fragments from a reaction is a much larger potential source of radiation power than that available from fission products or artificially produced radioisotopes like cobalt-60. While in conventional reactors recoil energy is dissipated as heat, a reactor could be designed to permit the escape of fission fragments from the nuclear fuel and their absorption in a chemical reactant.

For such a reactor, fuel-element size and reactor-core engineering requirements are severe, and difficult engineering problems must be solved before fission recoils can be directly utilized. Efficient utilization of fission recoils, the Battelle technologists point out, requires: (1) very small fuel-element dimensions for high efficiency (thus fine powders or packs of fine fibers may be most satisfactory); and (2) circulation of the chemical reactants through the reactor core, possibly as the only coolant. The yield of a chemical product processed in a reactor of this type can be calculated from heat balance and radiation chemistry considerations. The authors point out that for many radiation-induced reactions, the product yield per pass of the reactants through the reactor core will be very small even at high operating temperatures. At the same time, neutron activation of the chemical reactants will exclude many radiation-induced chemical reactions of potential interest in such a reactor.

The authors believe that to make the radiation synthesis of chemicals in a reactor core economic, the heat removed by the coolant must also be utilized. It is even likely that in dual-purpose reactors designed for both fission-fragment energy and heat utilization, synthesis of chemicals may be of secondary importance.

* LITHO PLATES BY XEROGRAPHY

Lithographic plates that can be prepared quickly have been the subject of great interest and effort in graphic-arts research. A long step in the achievement of that goal was recently accomplished through the development of a process for lithographic reproduction directly from xerographic plates. The method has been developed through the cooperation of The Haloid Company, the U. S. Army Engineer Corps, and technologists at Battelle.

The process was recently described by John J. Rheinfrank and Philip F. Kurz of Battelle and Frederick C. Myers of the Engineer Research and Development Laboratories. In the process, xerographic images are prepared and fixed directly on a special type of xerographic plate. The coating used consists of a photoconductive pigment such as zinc oxide dispersed in, and bound by, a film-forming resin having electrical resistivity. For long runs or multicolor work, the coating may be supported on metal plates, while suitable paper may be used as a basis for other purposes.

The print quality obtained with the xerographically-prepared plates is comparable with that obtainable in good-quality conventional lithographic printing. Press runs up to 25,000 impressions have been made from a single plate, with essentially no deterioration in image quality.

As compared with nonxerographic techniques, the new process has a number of advantages. In addition to being more rapid than other methods, it is a dry process and may not require an intermediate photo-

graphic transparency (good results have been obtained with line copy and with 300-line halftones). The plates, in this process, are not damaged by accidental exposure to light or to nuclear radiation or by errors made during exposure or development steps. Moreover, the plates are both positive working and negative working and no graining of the plate is required. Finally, the shelf life of the plate is excellent, extending well beyond 30 days with a minimum of treatment. Research is continuing with emphasis on devising techniques for halftoning images directly on the xerographic plate in a process camera.

* MALEIC-TALL OIL REACTIVITY

The formation of insoluble seed-like agglomerates in maleinized tall oil vehicles has frequently been a problem in the coatings industry. Coatings chemists have observed that in reacting maleic with tall oils, some tall oils can stand addition of more maleic than others without forming insoluble agglomerates in the cooking. In a study on this problem at Battelle for the Union Bag-Camp Paper Corporation, the major goals were to relate maleic reactivity with the composition of the tall oil and to develop a method of eliminating the formation of the insoluble material.

Battelle chemists E. E. McSweeney and Ernest R. Mueller, who directed the study, report that two methods were found for preventing the formation of insoluble material during the cooking of maleic-modified tall oil esters. It was discovered that pre-esterification of the tall oil with the polyol prior to maleic addition resulted in essentially seed-free vehicles even with the addition of excessive amounts of maleic.

The second successful method involved the heating of the tall oil to 450 F under an inert gas blanket or in a solvent reflux system. The maleic is then added at the same temperature and the mixture is held at 450 F until the maleic is completely reacted, as shown by the dimethyl aniline test. The polyol may then be safely added. The latter method, because it is the faster one, is the preferred one for commercial practice.

Early in the study, the chemists were able to rule out the possibility that the formation of insoluble materials was directly related to the abietic acid content of the tall oil. On the basis of these experiments, McSweeney and Mueller report, it appears that insolubles are not formed in the pre-esterification cooking because the fatty or rosin acids present solubilize the pentaerythritol-maleic complex in the remainder of the vehicle. Also, the acids act as chain stoppers to hinder rapid polymer buildup through cross-linking to the point of insolubilization.

* RESISTIVITY OF COBALT ALLOYS

Because of the greatly increased availability of cobalt, interest has grown in both the workability and the electrical resistivity of cobalt alloys. Interest in the latter is based upon cobalt's close relationship to iron and nickel, which are the more common base metals for electrical resistance alloys.

In a study for the Cobalt Information Center, Battelle metallurgists John C. Stewart, Joseph G. Dunleavy, and Albert M. Hall report that they selected the elemental additions to be made to the cobalt on the bases of atomic size, valence, crystallographic compatibility, and solid solubility. The metallurgists investigated binary, ternary, and other multicomponent combinations.

Of the binary alloys they explored, the Battelle technologists found the 60 cobalt-40 manganese composition of most interest. Because of its relatively high resistivity and good workability, the composition served as a good base for exploring more complex alloys.

The metallurgists discovered that the order of the effectiveness of the elements in raising resistance agreed generally with the order predicted from valency, atomic diameter, and solubility. The order of the decreasing effectiveness of the metals used was aluminum, silicon, titanium, zirconium, niobium, copper, and chromium. On an atomic-per cent basis, the order of decreasing effectiveness was zirconium, aluminum, titanium, silicon, copper, and chromium.

The technologists found that several members of this family of alloys may have electrical properties of commercial interest. Thus, an alloy of approximately 57.3 cobalt, 38.2 manganese, 4 aluminum, and 0.5 titanium (weight percent) showed resistivity of 75 ohms per circular mil foot.

* Four bibliographies on cobalt have been issued recently by the Cobalt Information Center. They will be of interest to technologists in a number of fields. The two shorter bibliographies are on "Cobalt in Stainless Steel" and "Cobalt in Cast Iron". Lengthier lists of publications are given in the "Corrosion Bibliography on Cobalt and Cobalt Alloys" and the "Bibliography on Electroplating of Cobalt and Cobalt Alloys". Copies may be obtained by writing to the Center at Battelle, 505 King Avenue, Columbus, Ohio.

Writings by STAFF Members

Symposium on Titanium. American Society for Testing Materials. 1957, contains the following papers by staff members:

The Effect of Composition and Annealing Treatment on the Thermal Stability of Chromium-Molybdenum Alloys of Titanium. H. R. Ogden, F. C. Holden, and R. I. Jaffee, pp. 32-47.

Annealing treatments originating in the beta field appeared to produce a stable condition more rapidly than annealing treatments originating in the alpha-beta field. Instability found in a five per cent Cr alloy is related to the formation of eutectoid products. The substitution of Mo for half of the Cr retards the eutectoid reaction resulting in a more stable condition.

The Effect of Temperature on the Uniform Elongation of Titanium Alloys. F. C. Holden, H. R. Ogden, and R. I. Jaffee, pp. 14-31.

The limits of uniform elongation were measured for typical alpha, alpha-beta, and beta Ti alloys over a temperature range from −75 to 300 C. Highest uniform elongation was obtained for commercial Ti alpha, while that for the beta-quenched 7.5 Cr, 7.5 Mo alloy was lowest. The dependence on temperature is marked, particularly in the two-phase alloys.

A Micro Notched-Bar Impact Test for Titanium Alloys. F. C. Holden, H. R. Ogden, and R. I. Jaffee, pp. 124-129.

The test is useful in studying impact behavior where insufficient material is available for the standard V-notch Charpy test. Test specimens can be machined inexpensively from one-fourth-inch diameter rod stock. Data for several Ti alloys and other materials show the comparison between this test and standard impact tests.

Variables Affecting the Thermal Stability of Three Titanium Alloys. F. R. Schwartzberg, D. N. Williams, and R. I. Jaffee, pp. 3-13.

The effects of variations in stress, strain, time, and temperature during thermal exposure on the tendency toward thermal instability in Ti-2Mo-2Cr-2Fe, Ti-6Al-4V, and Ti-4Al-4Mn alloys were investigated. None of these alloys, which were vacuum annealed and given a stabilizing heat treatment before exposure, showed evidence of instability over a wide range of exposure conditions.

Transactions, American Society of Heating and Air-Conditioning Engineers. Vol. LXIII, 1957, contains the following papers by staff members:

Pulsations in Residential Heating Equipment. Preliminary Results. A. A. Putnam and W. R. Dennis, pp. 153-170.

Theoretical and experimental methods used to investigate the fundamental nature of pulsations in oil- and gas-fired residential furnaces and boilers are described. The oscillations thus far encountered are of the standing-wave type. The design of two experimental furnaces and preliminary test results are reported.

Acoustic Coupling of Residential Furnaces With Their Surroundings. C. F. Speich, W. R. Dennis, and A. A. Putnam, pp. 413-426.

Studies with residential gas- and oil-fired furnace-burner units indicate that coupling can occur between the unit and the room in which it is placed. Factors to be considered in determining the proper furnace location for low noise level are discussed.

Heat of Formation of Titanium Tribromide by the Mercury Reduction of Titanium Tetrabromide. Elton H. Hall and John M. Blocher, Jr. *Electrochemical Society, Journal,* v. 105, January 1958, pp. 40-44.

The experimentally determined heat of reaction, $\frac{1}{2}Hg_2Br_2(s) + TiBr_3(s) = TiBr_4(g) + Hg(1)$, $\Delta H_{475} = 23.0 \pm 1.2$ kcal is combined with existing data for $TiBr_4$, Hg, and Hg_2Br_2 to obtain for the heat of formation and standard entropy of $TiBr_3$, $\Delta H°_{f298.2} = -130.6 \pm 1.2$ kcal/mole and $S°_{298.2} = 43.4 \pm 1.6$ e.u.

Analysis of High-Purity Iron. R. E. Heffelfinger, D. L. Chase, G. W. P. Rengstorff, and W. M. Henry. *Analytical Chemistry,* v. 30, January 1958, pp. 112-114.

Methods used at Battelle Memorial Institute for determining impurities in high-purity iron are described. Separation of metallic impurities by ether extraction of iron and spectrographic analysis of the remaining aqueous solution are used for Mn, Cu, Ni, Cr, V, Co, Al, Pb, Ti, W, and Zr. Sulfide precipitation and subsequent spectrographic analysis are used for elements in the sulfide group. Methods for Si, Mg, Ca, B, C, O, H, and N are included.

How Wrong Can Elastic Constants Be? S. A. Gordon. *Product Engineering,* v. 29, January 1958, pp. 68-71.

Analysis of the effect of small variations in elastic constants as applied in eight common design equations shows why precise determinations are not always vital for accurate structure design.

Analysis of Radiation Resistivity of Reactor Building Materials. **Untersuchung der Strahlenfestigkeit von Reaktorstoffen.** P. Müller. *Atomkernenergie,* v. 2, August-September 1957, pp. 312-315.

The following tasks are suggested: 1) determination of all factors affecting the resistance of materials to radiation, 2) preparation of exact data on the extent of the expected changes in the properties of materials, 3) preparation of the data needed for computing the effective power of reactors, 4) development of materials with higher resistivity to radiation, also search for the best methods for producing such materials.

Radioactive-Tracer Technique for Studying Grinding Ball Wear. M. Pobereskin, N. M. Ewbank, Jr., G. D. Calkins, A. Wesner, and J. E. Campbell. *Mining Engineering,* v. 9; *American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions,* v. 208, December 1957, pp. 1356-1358.

Describes a technique for recovery and separation of steel grinding balls and subsequent evaluation of the various compositions of the balls. The procedure involves thermal-neutron irradiation activation of each group of test balls to a different level of specific radioactivity, addition of groups of the radioactive balls into a ball mill, recovery of the radioactive specimens from the bulk of the mill charge, separation of the various groups by their specific radioactivity, and evaluation of actual grinding ball wear.

Members of the Battelle staff are authors of the recently published articles and books listed on these pages. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

WORLD-WIDE ABSTRACTS

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BATTELLE Technical Review ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

3094 Comparison of the Take-Off Noise Characteristics of the Caravelle Jet Airliner and of Conventional Propeller-Driven Airliners. Laymon N. Miller and Leo L. Beranek. *Acoustical Society of America, Journal*, v. 29, Nov. 1957, p. 1169-1179.

3095* (English.) **The Drag of Streamline Bodies of Revolution in a Wind Tunnel.** G. S. Vasy. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 317-324.

Several approximate methods for determination of wind tunnel correction of the drag coefficient are given.

3096* Thermal Creep Design Criteria. Robert Goldin. *Aeronautical Engineering Review*, v. 16, Dec. 1957, p. 36-41.

Elevated temperature criteria needed by the stress analyst in translating limit load-temperature-life conditions and material property (or allowable) data into actual cross-sectional areas of structural elements. Covers yield strength, ultimate strength, fatigue, and rigidity.

3097* The Roll Coupling Problem. A Mathematical Approach. R. Westerwick. *Aeronautical Engineering Review*, v. 16, Dec. 1957, p. 48-51.

A method of determining augmentation of high-performance aircraft to reduce inherent susceptibility to inertia coupling.

3098* Some Early Jet Flap Experiments. N. A. Dimmock. *Aeronautical Quarterly*, v. 8, Nov. 1957, p. 331-345.

"Second stage" two-dimensional jet flap experiments are described. Reynolds number and ground interference effects; flow visualization.

3099* Flow About Cones at Very High Speeds. H. K. Zienkiewicz. *Aeronautical Quarterly*, v. 8, Nov. 1957, p. 384-394.

Effects of vibrational excitation and dissociation of air on inviscid high speed flow past a circular cone, at zero incidence, with an attached shock wave, are studied on the assumption of thermal equilibrium. Numerical solution of the problem is outlined.

3100 (Italian.) An Analytical Study of Spin Based on Horizontal Wind Tunnel Experiments and a Method for Testing Models in Free Air. **Studio analitico della vite utilizzando esperienze eseguite alla galleria del vento orizzontale e metodo di prova di modelli in aria libera.** Ermanno Bazzocchi. *Aerotecnica*, v. 37, no. 4, Aug. 1957, p. 178-200.

Fundamental spin equations. Experimental method for measuring aerodynamic coefficients based on a horizontal wind tunnel test. Possibility of a separate study of different influencing factors in low-altitude free-air tests.

3101 (Italian.) Thermal Elastodynamics of Hollow Wings. **Termoelastodinamica delle ali a guscio.** Paolo Santini. *Aerotecnica*, v. 37, no. 4, Aug. 1957, p. 201-208.

Thermal and elastic properties of wing structures during rapid variations in temperature.

3102 Aircraft Annual, 1958. John W. R. Taylor, editor. 96 p. 1957. Philosophical Library, New York. (TL501 Ai74a)

A series of brief histories, anecdotes, and photographs illustrating the latest aviation developments and techniques, including both military and civilian programs.

3103 Establishment of Lift on an Aerofoil With a Jet Flap. R. Hirsch. *Aircraft Engineering*, v. 29, Dec. 1957, p. 366-375.

A theoretical note relating to a wing with trailing edge jet with extension to cover wings of finite span. (To be continued.)

3104* Pneumatic Diaphragm Valves Control Cooling Air Temperature. Clinton G. Miller. *Applied Hydraulics*, v. 10, Dec. 1957, p. 120 + 2 pages.

Poppet and gate-type, pneumatically operated valves control cooling air temperature within close limits on the Convair B-58 Hustler.

3105* (French.) Modern Methods of Aerial Navigation. **Méthodes modernes de navigation aérienne.** J. Carpentier. *DOCAERO; Revue Documentaire de la Technique Aéronautique Mondiale*, 1957, no. 47, Nov., p. 33-52.

Dead reckoning, radio, and astronomical navigation. New trends and inertial indicators. Double integration of acceleration measurements. Gyroscopic angular reference. Effects of errors. New radio electrical processes.

3106 Trajectory Programming for Maximum Range. George Leitmann. *Franklin Institute, Journal*, v. 264, Dec. 1957, p. 443-452.

Necessary conditions are derived for the existence of the optimum direction of thrust and angle of attack of a rocket traveling in the atmosphere subject of forces of gravity, aerodynamic drag, and lift.

3107 Optimum Burning Program as Related to Aerodynamic Heating for a Missile Traversing the Earth's Atmosphere. Angelo Miele. *Jet Propulsion*, v. 27, Dec. 1957, p. 1231-1240.

An explicit solution was obtained for the optimizing mass flow and is defined by the variable-thrust sub-arc.

3108* New Methods in Heat Flow Analysis With Application to Flight Structures. M. A. Biot. *Journal of the Aeronautical Sciences,* v. 24, Dec. 1957, p. 857-873.

New methods are presented for the analysis of transient heat flow in complex structures, leading to drastic simplifications in the calculation and the possibility of including nonlinear and surface effects.

3109* An Extension of the Theory of the Optimum Burning Program for the Level Flight of a Rocket-Powered Aircraft. Angelo Miele. *Journal of the Aeronautical Sciences,* v. 24, Dec. 1957, p. 874-884.

The burning program which minimizes an arbitrary function of the final values of time, mass, distance, and velocity is investigated. The totality of extremals is composed of zero thrust sub-arcs, sub-arcs to be flown with maximum engine output, and variable thrust sub-arcs.

3110* The Axisymmetric Supersonic Flow Near the Nose of a Pointed Body of Revolution. Luigi G. Napolitano and Antonio Ferri. *Journal of the Aeronautical Sciences,* v. 24, Dec. 1957, p. 900-904.

3111 The Response of a Bisymmetric Aircraft to Small Combined Pitch, Yaw, and Roll Control Actions. Robert A. Davis. *Journal of the Aeronautical Sciences,* v. 24, Dec. 1957, p. 905-910.

3112 Report of the High-Strength High-Temperature Materials for Standard Parts Symposium. 393 p. 1957. Aircraft Industries Assn., Washington, D. C. (TL671.1 Ai74r)

Consists of 16 papers and discussion panels on aircraft parts application, high-strength high-temperature materials, and government plans and programs.

3113 Future Aircraft Requirements. S. A. Gordon. Paper from "Report of the High-Strength High-Temperature Materials for Standard Parts Symposium". Aircraft Industries Assn., 1957. p. 3-11. (TL671.1 Ai76r)

Developments in the 55-yr. history of flight have based on power plant, aerodynamics, and structural analysis. Future problems are in the field of materials and structural design for strength at elevated temperatures. Research is needed to develop new materials and to determine the best weight compromise with materials presently available.

3114 Engine-Airframe Integration. L. F. Nicholson. *Royal Aeronautical Society, Journal,* v. 61, Nov. 1957, p. 711-726.

Discussion of aircraft layouts which might result from thorough integration of power plant and airframe.

3115 Steel Can Be Used to Produce Lighter Aircraft. Bruce Mitchell. *SAE Journal,* v. 65, Dec. 1957, p. 56-58.

Low weight and high strength are achieved by using steel foil that is stiffened locally with miniature corrugations and by tapering the spar caps to match the load.

3116 The Useful Heat Capacity of Several Materials for Ballistic Nose-Cone Construction. Jackson R. Stalder. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4141, Nov. 1957, 19 p. (TL570 Un3t)

Analysis of the heat-absorption characteristics of Cu, Inconel-X, graphite, and Be indicates that significant weight saving could be achieved in a ballistic missile heat sink by the use of graphite or Be in place of Cu.

3117 Measurement of Static Pressure on Aircraft. William Gracey. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4184, Nov. 1957, 71 p. (TL570 Un3t)

Methods of calibrating static-pressure installations; errors involved in measurements; characteristics of desirable installations.

3118 Experimental Droplet Impingement on Four Bodies of Revolution. James P. Lewis and Robert S. Ruggeri. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4092, Dec. 1957, 61 p. (TL570 Un3t)

Study of rate and area of cloud droplet impingement included spheres, ellipsoidal forebodies of fineness ratios of 2.5 and 3.0, and a conical forebody of 30° included angle and covered a range of angles of attack from 0 to 6° and rotational speeds up to 1200 r.p.m.

3119 Effects of Leading-Edge Blunting on the Local Heat Transfer and Pressure Distributions Over Flat Plates in Supersonic Flow. Marcus O. Creager. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4142, Dec. 1957, 54 p. (TL570 Un3t)

Surface pressures and heat-transfer rates were measured on flat plates with various values of blunting for a Mach number of 4 and Reynolds numbers per in. of 2380 and 6600.

3120 An Experimental and Theoretical Study of the Effect of Fuel on Pitching-Translation Flutter. John L. Sewall. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4166, Dec. 1957, 42 p. (TL570 Un3t)

3121 A Reexamination of the Use of Simple Concepts for Predicting the Shape and Location of Detached Shock Waves. Eugene S. Love. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4170, Dec. 1957, 53 p. (TL570 Un3t)

Results show that simple concepts and modifications of existing methods can yield good predictions for many nose shapes and for a wide range of Mach numbers.

3122 An Analytical Investigation of the Gust-Alleviating Properties of a Simple Pitch Damper. Norman L. Crabill. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4173, Dec. 1957, 47 p. (TL570 Un3t)

The response to atmospheric gusts of a lightly damped airplane model flying at a Mach number of 0.7 at sea level was analyzed with elevator fixed and with varying amounts of viscous restraint of a mass-overbalanced elevator.

3123 Investigation of the Effects of Propeller Diameter on the Ability of a Flapped Wing, With and Without Boundary-Layer Control, to Deflect a Propeller Slipstream Downward for Vertical Take-Off. Kenneth P. Spreemann. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4181, Dec. 1957, 47 p. (TL570 Un3t)

3124 Molecular Approach to Problems of High-Altitude, High-Speed Flight. G. N. Patterson. *University of Toronto, Institute of Aerophysics, UTIA Review No.* 10, May 1957, 65 p. (TL570 T64.84r Vis.)

Effects of rarefaction and high temperatures on the flow of gases are considered. The regimes of fluid mechanics based on those considerations and the modern experimental methods for their investigations are discussed.

3125 An Experimental Investigation of Temperature and Pressure Recovery, Running Time and Blockage Characteristics of the UTIA 16 Inch x 16 Inch Supersonic Wind Tunnel. John Bremner Murray. *University of Toronto, Institute of Aerophysics, UTIA Technical Note No.* 16, Aug. 1957, 34 p. (TL570 T64.84t Vis.)

The effect of various cone model configurations was studied.

3126 Supersonic Panel Flutter. Yudell L. Luke and Andrew St. John. *Wright Air Development Center Materials Laboratory, WADC Technical Report* 57-252, July 1957, 76 p. (TL507 Un3.18w Vis.)

The panel flutter equation for the finite aspect ratio, plate-membrane is presented. Air forces are derived in a form convenient for computation and are shown to be especially amenable for the cases of infinite aspect ratio and pinned tip finite panels.

3127* (German.) Reflection of Shock Waves in a Wind Tunnel. **Reflexion von Stosswellen in Windkanälen.** Bernhard H. Goethert. *Zeitschrift für Flugwissenschaften,* v. 5, no. 11, Nov. 1957, p. 313-327.

The wave system produced by cone-cylinder models cannot be effectively absorbed by either conventional perforated or slotted test-section walls. In the case of perforated test sections, it is relatively easy to eliminate reflections of the initial conical shock and the subsequent compression-wave system by suitable selection of the wall geometry.

See also: **3647** (aircraft simulator); **3648** (design of propeller control system); **3669** (missile stabilizing system); **3684** (pilotless aircraft telemetering equip-

ment); **3688** (aircraft generating equipment); **3696** (aircraft generators); **3966** (steel or Al in aircraft cylinders); **3998** (thermal stress analysis); **4345** (radiation - measuring instrumentation); **4348** (nuclear reactors for aircraft); **4583** (aircraft air conditioning).

AGRICULTURE

3128* (Italian.) Mobility of Different Forms of Phosphorous in the Soil. **La mobilita delle diverse forme del fosforo nel suolo.** Carlo Alberto Cecconi. *Agrochimica*, v. 1, no. 4, Sept. 1957, p. 338-349.

Shows that several physical and chemical factors affect, in different measure, the P_2O_5 mobility in soil.

3129* (German.) Investigation of the Radioactivity of Vegetation. **Untersuchungen über die Radioaktivität der Vegetation.** Walter Herbst, Hanns Langendorff, Kurt Philipp, and Kurt Sommermeyer. *Atomkernenergie*, 1957, no. 10, Oct., p. 357-367.

The activity of grasses and leaves of various plants was studied. Radiochemical analyses were also made.

3130* Studies on the Seed Transmission of Plant Virus Diseases. N. C. Crowley. *Australian Journal of Biological Sciences*, v. 10, Nov. 1957, p. 449-464.

Evidence that the rarity of seed transmission is due to the inability of most viruses to infect mega- or microspore mother cells of infected plants together with the inability of viruses to infect the developing embryo because of the lack of plasmodesmatal connection with the endosperm.

3131* The Biosynthesis of Sucrose. J. F. Turner. *Biochemical Journal*, v. 76, Nov. 1957, p. 450-456.

Experimental evidence is consistent with the synthesis of sucrose by means of a reaction between uridine diphosphate glucose and fructose.

3132* The Significance of the Permanent Wilting Percentage in Studies of Plant and Soil Water Relations. R. O. Slatyer. *Botanical Review*, v. 23, Dec. 1957, p. 585-636.

Instead of being a soil constant, the permanent wilting percentage is essentially dependent upon the plant under study, as the osmotic pressure of the plant leaves is fundamentally the factor determining the point at which permanent wilting occurs.

3133* (Russian.) The Physiological Peculiarities of the Main Forms of the Rhizospheric Bacteria of Spring Wheat. **Fiziologicheskie osobennosti osnovnykh form rizosfernykh bakterii iarovoi pshenitsy.** M. V. Fedorov and D. Pantosh. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 149-152.

Study of ammonifying, denitrifying, and nitrogen-fixing activity of rhizospheric bacteria developing on the root surfaces of spring wheat. Determination of their interrelation with the plant and their part in transforming nourishing materials of importance for successful growth of the plant.

3134* (English.) **Anatomic Effects of Barley Yellow Dwarf Virus and Maleic Hydrazide on Certain Gramineae.** Katherine Esau. *Hilgardia*, v. 27, Sept. 1957, p. 15-69.

Determination of primary and secondary anatomic changes induced by the yellow dwarf virus in its various hosts; comparison of changes with those brought about by a treatment with maleic hydrazide.

3135* (English.) **Fundamentals of Biological Control of Weeds.** C. B. Huffaker. *Hilgardia*, v. 27, Sept. 1957, p. 101-157.

Nature of weed infestations and the place of biological control; kinds of natural enemies; nature of damage to the weed; risks of introduction and host specificity; balance in nature; environmental fitness and the choice of agents; procedures.

3136 Microdetermination of the Fungicide Dinitrocaprylphenylerotonate in Food Crops and Animal Tissues. Isadore Rosenthal, C. F. Gordon, E. L. Stanley, and M. H. Pearlman. *Journal of Agricultural and Food Chemistry*, v. 5, Dec. 1957, p. 914-918.

Reproducible results are obtained at a sensitivity as low as 10 γ of Karathane in a 200-gram fruit or vegetable sample.

3137 Modification of Selenite Metabolism by Arsenite. Ivan S. Palmer and Carl W. Bonhorst. *Journal of Agricultural and Food Chemistry*, v. 5, Dec. 1957, p. 928-930.

Partial control of Se poisoning in livestock was effected by feeding various As compounds.

3138 The Mechanism of Sorption of Ethylene Dibromide on Moist Soils. F. Call. *Journal of the Science of Food and Agriculture*, v. 8, Nov. 1957, p. 630-639.

It is suggested that sorption on soils at field capacity is partly due to solution in the soil water and partly to sorption at the water interfaces.

3139 Studies on Crop Response to Molybdenum and Lime in Michigan. Fred Turner and W. W. McCall. *Michigan State University, Agricultural Experiment Station, Quarterly Bulletin*, v. 40, no. 2, Nov. 1957, p. 268-281.

3140 Gibberellin and Higher Plants. X. Field Observations With Certain Vegetable Crops. S. H. Wittwer and M. J. Bukovac. *Michigan State University, Agricultural Experiment Station, Quarterly Bulletin*, v. 40, no. 2, Nov. 1957, p. 352-364.

Effects on bush snap beans, celery, cucumbers, muskmelons, peas, radishes, rhubarb, sweet corn, and tomatoes.

3141 Plant Life. 237 p. 1957. Simon and Schuster, New York. (QK711 Sci27p)

Growth substances; agroclimatology; growth and form; green and red leaves; plant dynamics; evolution and the plant community; applied genetics.

3142* Effect of Gibberellin on Growth, Flowering and Fruiting of the Earlypak Tomato, *Lycopersicum Esculentum*. Lawrence Rappaport. *Plant Physiology*, v. 32, no. 5, Sept. 1957, p. 440-444.

Gibberellin stimulated growth, flowering, and fruit set.

3143* Factors Affecting Absorption and Translocation of Foliar Applied Phosphorus. Harold Koontz and Orlin Biddulph. *Plant Physiology*, v. 32, no. 5, Sept. 1957, p. 463-470.

3144* (Polish.) Insecticidal Activity of the Products of Transformation of 1,1,1 - Trichloro - 2,2 - bis-(p-Fluorophenyl-Ethene (DFDT). **O czynności owadobójczej produktów przemiany 1,1,1-trójchloro-2,2-bis-(p-fluorofenylo)-etanu (DFDT).** S. Byrdy, Z. Eckstein, W. Sobótka, and H. Winsztal. *Przemysł Chemiczny*, v. 13, no. 9, Sept. 1957, p. 540-542.

The activity of DFDT and of 1,1-dichloro-2,2-bis-(p-fluorophenyl)-ethene against *Calandra granaria* exceeds that of DDT.

See also: **3221** (arsenical fungicides); **3229** (methods for studying clay soils); **3270** (manufacture of NH_4NO_3 fertilizers).

BIOCHEMISTRY AND BIOPHYSICS

3145* (English.) **Electrophoresis of Proteins in the Presence of Interacting Ions.** Kurt Schilling. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1103-1110.

The interaction of human, bovine, and equine serum proteins with various protein precipitating ions was investigated by means of moving boundary electrophoresis.

3146* (English.) **Roentgenography in High Magnification. Reliability and Limitation of Enlargement.** Shinji Takahashi and Mikio Yoshida. *Acta Radiologica*, v. 48, no. 4, Oct. 1957, p. 280-288.

Experiments in enlargement radiography with a rotating anode bias tube of very fine variable focus capable of resolving tungsten wires of 25 μ in diameter.

3147 Triethylenephosphoramide in the Treatment of Disseminated Melanoma. James L. Tullis. *American Medical Association, Journal*, v. 166, Jan. 4, 1958, p. 37-41.

A series of 15 patients with disseminated malignant melanoma was studied for the effect of treatment with triethylenephosphoramide (TEPA). TEPA produced an occasional striking remission.

3148 The Tranquilizers. IV. Ivan F. Bennett. *American Pharmaceutical Association, Journal (Practical Pharmacy Ed.)*, v. 18, Dec. 1957, p. 714-716.

Uses and abuses of benactyzine, phenaglycodol, methylparafynol, 2-ethyl-crotonyl-urea, oxanamide, 5-androstene-3, 16-diol, and hydroxyzine.

3149 A Cylinder-Plate Method for the Quantitative Determination of Diffusion of Antibacterial Drugs From Ointments. Elmer M. Plein and Joy Bickmore Plein. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Dec. 1957, p. 716-720.

The results of simple cylinder-plate-inhibition zone diffusion tests in six ointment bases are compared with the data obtained in testing diffusion from the ointments by the cylinder-plate standard curve method. Fallacy in comparing diffusion on inhibition zones alone is pointed out, and standard curve method is recommended.

3150 Paper Chromatographic Evaluation of Rauwolfia Species. B. P. Korzun, A. F. St. André, and P. R. Ulshafer. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Dec. 1957, p. 720-723.

A number of the species are evaluated for reserpine content and for the distribution of other alkaloids.

3151 Isonicotinoyl Hydrazine Derivatives and Their Activity Against *Mycobacterium tuberculosis* in the Mouse. Richard E. Strube and Kurt F. Stern. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Dec. 1957, p. 738-741.

Four sulfur-containing isonicotinoyl hydrazine derivatives were studied. Zinc and Sb 3-isonicotinoyl dithiocarbazinates, although highly active, are not superior to isonicotinoyl hydrazine.

3152 Reaction of Rauwolfia Alkaloids, Indoles, and Related Compounds to Nitrite. R. P. Haycock and W. J. Mader. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Dec. 1957, p. 744-747.

The greenish-yellow color complex resulting from the addition of sodium nitrite to an alcoholic solution of reserpine in the presence of dilute sulfuric acid was re-examined. A new indican reaction is reported for simpler indoles.

3153 Some Principles of Bioassay. C. I. Bliss. *American Scientist*, v. 45, Dec. 1957, p. 449-466.

Type of response used as indicators; the relative nature of a bioassay; precision of the assayed potency; experimental design.

3154* (German.) Photosynthesis. **Photosynthese.** O. Warburg, W. Schröder, G. Krippahl, and H. Klotzsch. *Angewandte Chemie*, v. 69, no. 20, Oct. 21, 1957, p. 627-634.

The conditions, on which the nearly complete utilization of light energy in photosynthesis depends, and the interaction of light energy and respiration energy, and thus the solution of the quantum problem of photosynthesis, are reported. Chlorophyll takes part in the reaction as a stoichiometric-chemical reactant.

3155* (English.) **Turnover Rate of Phosphate in Mitochondrial Thiamine Diphosphate.** Karl-Heinz Kiessling. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 451-454.

The incorporation rate of radioactive phosphate in intramitochondrial TDP was studied. The rate is dependent of the presence of pyruvate. With pyruvate as a substrate the incorporation rises to about 2/5 of that of ATP-ADP after 7-min.

3156* (English.) **L- and D-Leucyl-Glycine-Splitting Dipeptidases in *Elodea densa*.** Per Johan Palmcrantz. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 455-461.

The hydrolysis of D- and L-leucyl-glycine by glycerol-water extracts of *Elodea densa* was determined. The activity against the L-form was about ten times that against the D-form. pH-Optimum of the D-peptidase was found to be 8.5, that of the L-peptidase 9.0.

3157* (English.) **Inhibition of Yeast Invertase (Saccharase) by Metal Ions. V. Inhibition by Mercury Compounds.** Karl Myrbäck. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 471-479.

Yeast invertase is strongly inhibited by $HgCl_2$, phenylmercury acetate, *p*- and *m*-chloromercury-benzoates, and *o*-hydroxymethylphenylmercury chloride.

3158* Nutritive Evaluation of Phosphorus Supplements. V. Utilization of Feed Grade Phosphates by the Rat. C. A. Cabell, I. P. Earle, W. R. Kauffman, and R. E. Davis. *Association of Official Agricultural Chemists, Journal*, v. 40, Nov. 1957, p. 1050-1056.

Rat feeding experiments, in which body weight gain, femur ash, and serum inorganic phosphorus measurements were used as criteria, showed that dicalcium phosphate samples averaged highest in nutritive availability.

3159* Studies in Anaphylaxis. II. Dose Responses to Bovine Plasma Albumin in Mice. W. R. Sobey and K. M. Adams. *Australian Journal of Biological Sciences*, v. 10, Nov. 1957, p. 475-483.

Factors controlling anaphylaxis. Relation of optimal shocking dose to the amount of available antibody. The optimal shocking dose for bovine plasma albumin was found to be 0·05 mg. for both passive and active anaphylaxis.

3160 The Beginnings of Embryonic Development. Albert Tyler, R. C. von Borstel, and Charles B. Metz, editors. 400 p. 1957. American Association for the Advancement of Science, Washington, D. C. (QL951 Am35.9b)

Thirteen papers from a symposium emphasizing the initiation of development and subsequent events as related to nuclear and cytoplasmic factors.

3161* The Blocking Activity of Sympathomimetic Amines on Adrenaline Hyperglycaemia. Adrienne Gourju and A. Lawson. *Biochemical Journal*, v. 67, Nov. 1957, p. 357-360.

Ephedrine and norephedrine significantly reduced this condition in rats.

3162* The Accumulation of Iodide by *Fucus ceranoides*. H. B. Klemperer. *Biochemical Journal*, v. 67, Nov. 1957, p. 381-390.

The mechanism of uptake of iodide appeared to be very similar to that in the thyroid gland.

3163* Reaction of Ninhydrin in Acid Solution With Straight-Chain Amino Acids Containing Two Amino Groups and Its Application to the Estimation of αε-Diaminopimelic Acid. Elizabeth Work. *Biochemical Journal*, v. 67, Nov. 1957, p. 416-423.

3164* The Solubility and Fractionation of β_1-Lactoglobulin. M. P. Tombs. *Biochemical Journal*, v. 67, Nov. 1957, p. 517-523.

Tests indicate that β_1-lactoglobulin contains two proteins; fractionation produced the major component in a nearly pure state.

3165* (English.) **Small Angle X-Ray Scattering Studies of the Size, Shape, and Hydration of Catalase.** A. G. Malmon. *Biochimica et Biophysica Acta*, v. 26, no. 2, Nov. 1957, p. 233-240.

3166* (English.) **Biosynthesis by *Escherichia Coli* of Active Altered Proteins Containing Selenium Instead of Sulfur.** Dean B. Cowie and Georges N. Cohen. *Biochimica et Biophysica Acta*, v. 26, no. 2, Nov. 1957, p. 252-261.

Selenomethionine can completely replace methionine for the normal exponential growth of a methionine-requiring mutant of *E. coli*. β-Galactosidase is formed under these conditions.

3167* (English.) **The Synthesis of Methionine by Enzymic Transmethylation. I. Purification and Properties of Thetin Homocysteine Methylpherase.** J. Durell, D. G. Anderson, and G. L. Cantoni. **II. Enthalpy Change in the Methyl-Transfer From Dimethylacetothetin.** J. Durell and J. M. Sturtevant. *Biochimica et Biophysica Acta*, v. 26, no. 2, Nov. 1957, p. 270-286.

3168* (Russian.) A Study of Photooxidation Sensitized by Chlorophyll and Pheophytin. **Issledovanie fotookisleniia, sensibilizirovannogo khlorofillom i feofitinom.** G. P. Brin and A. A. Krasnovskii. *Biokhimiia*, v. 22, no. 5, Sept.-Oct. 1957, p. 776-788.

Conditions of oxidation of ascorbic acid sensitized by chlorophyll and pheophytin, and the photooxidation of various H doners.

3169* (Russian.) The Effect of Factors From Extracts of Neoplastic Tissues Containing Loosely Bound Sulfur Upon Tumor Development and the Activity of Liver Catalase of the Host. **Vliianie faktorov iz ekstraktov neoplasticheskikh tkanei, soderzhashchikh labil'no sviazannuiu seru, na razvitie opukholi i na aktivnost' pechenochnoi katalazy khoziaina.** F. Shorm and A. Iakubovich. *Biokhimiia*, v. 22, no. 5, Sept.-Oct. 1957, p. 849-854 + 1 plate.

Loosely bound sulfur in neoplastic tissues is several times greater than that of normal or embryonic tissue. It is concluded that factors containing loosely bound sulfur reduce the activity of liver catalase and are related to the so-called "accelerating" factors which speed up the malignant process.

3170* (Russian.) On Viscous Flow of the High Polymer Desoxyribonucleic Acid. **O viazkom techenii vysokopolimernoi dezoksiribonukleinovoi kisloty.** V. I. Vorob'ev and E. D. Nensberg. *Biokhimiia*, v. 22, no. 5, Sept.-Oct. 1957, p. 894-903.

Flow depends on the structural organization of the polymer as well as on the degree of deformation.

3171* (Russian.) The Stability of Monosaccharides in Solutions of Different pH. **Ustoichivost' monosakharidov v rastvorakh s razlichnym pH.** V. A. Smirnov and K. A. Geispits. *Biokhimiia*, v. 22, no. 5, Sept.-Oct. 1957, p. 904-910.

The stability of glucose, galactose and arabinose was tested in buffered solutions of different pH at 100 C.

3172 The Interrelation of the Growth and Metabolic Responses to Anterior Pituitary Growth Hormone Administration. George H. Beaton, Hannah Z. Banky, and Audrey M. Haufschild. *Canadian Journal of Biochemistry and Physiology*, v. 35, Dec. 1957, p. 1113-1118.

Doses of growth hormone which were minimal with respect to body weight increase were sufficient to produce significant alterations in liver alanine-glutamic transaminase and arginase activities, and blood urea and amino nitrogen levels. Biochemical effects of the hormone appeared coincident with the body weight increase.

3173 Biochemical Studies on Chlorpromazine. I. The Effect of Chlorpromazine on Respiratory Activity of Isolated Rat Brain Cortex. II. Effects of Chlorpromazine on Incorporation Into Proteins, and Breakdown of Glycine-1-C^{14} by Isolated Rat Brain Cortex. O. Lindan, J. H. Quastel, and S. Sved. *Canadian Journal of Biochemistry and Physiology*, v. 35, Dec. 1957, p. 1135-1150.

3174 The Preparation of Lecithin From L-α-Glycerylphosphorylcholine. N. H. Tattrie and C. S. McArthur. *Canadian Journal of Biochemistry and Physiology*, v. 35, Dec. 1957, p. 1165-1170.

L-α-Lecithin (dipalmitoyl) was prepared from L-α-glycerylphosphorylcholine by acylation with palmitoyl chloride in anhydrous chloroform in a yield of about 31%. This reaction also gives rise to two by-products having hemolytic activity.

3175 Certain Metabolic Effects of Corticotropin, Hydrocortisone, Prednisone, and Aspirin in Normal Dogs. O. H. Gaebler, Rachel Glovinsky, Helen Lees, and Trieste Vitti. *Canadian Journal of Biochemistry and Physiology*, v. 35, Dec. 1957, p. 1183-1188.

3176 Separation of Endomycins A and B, and Their Identification as Members of the Polyene Groups of Antifungal Antibiotics. L. C. Vining and W. A. Taber. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1461-1466.

An unidentified *Streptomyces* species isolated from platings of "honey dew" of the fungus *Claviceps purpurea* produced two antifungal antibiotics which were shown by paper chromatography to be identical with the two active components of endomycin and also with helixins A and B.

3177* The Enumeration of Thermophilic Bacteria by the Plate Count Method. Nora E. Neilson, Mary F. MacQuillan, and J. J. R. Campbell. *Canadian Journal of Microbiology*, v. 3, Dec. 1957, p. 939-943.

Estimation is greatly influenced by the composition of the diluent and by its temperature. A satisfactory diluent consisted of 0.8% KCl in *M*/200 pH 7.2 potassium phosphate buffer.

3178* Amidomycin, a New Antibiotic From a Streptomyces Species. Production, Isolation, Assay, and Biological Properties. W. A. Taber and L. C. Vining. *Canadian Journal of Microbiology*, v. 3, Dec. 1957, p. 953-965.

Antifungal preparations were obtained from cultures of *Streptomyces* PRL 1642 by solvent extraction of the solids collected after the pH was adjusted to 3.5. The active factor, named amidomycin, was purified by repeated crystallization from aqueous ethanol or petrol (b.p. 60-80 C.) to give stable, colorless, optically active needles, m.p. 192 C.

3179* Some Vitamin and Amino Acid Interrelationships in *Escherichia* Coli 113-3. I. The Inhibitory Effects of Cystine and Cysteinesulphinic Acid. J. M. McLaughlan. *Canadian Journal of Microbiology*, v. 3, Dec. 1957, p. 967-974.

3180 Radiophosphorus Metabolism in Zooplankton and Microorganisms. Eugene Harris. *Canadian Journal of Zoology*, v. 35, Dec. 1957, p. 769-782.

The exchange of radiophosphorus between water on the one hand and *Artemia*, *Gammarus*, and microorganisms on the other was observed. Results are expressed as turnover time, which is related to the rate at which P moves back and forth.

3181 Drying Viable Biological Materials by Solvent/Extraction and Azeotropic Distillation. R. R. Freeman, et al. *Chemical Engineering Progress*, v. 53, Dec. 1957, p. 590-592.

The scope of standard chemical engineering techniques is illustrated by their application to the processing of extremely delicate biological materials.

3182 Cyto-Active Amino-Acids and Peptides. IV. Synthesis of α-[*p*-Di-(2-Chloroethyl)Amino-Benzylidene- and -Benzyl-] Hippuramides and -Hippuramido-Acids. F. Bergel and J. A. Stock. *Chemical Society, Journal*, 1957, Nov., p. 4563-4567.

3183* (German.) Amino Sugar. **Aminozucker.** Almuth Klemer. *Chemische Technik*, v. 9, no. 10, Oct. 1957, p. 584-597.

Occurrence of amino sugar in high-molecular substances and as structural elements of low-molecular substances. Qualitative and quantitative determination. Structure of D-glucosamine. Synthesis of amino sugar. Carbon hydrate amino acid compounds. Structures and reactions of acetohalide derivatives of D-glucosamine.

3184 The Chemistry of Organic Medicinal Products. Glenn L. Jenkins, Walter H. Hartung, Kenneth E. Hamlin, Jr., and John B. Data. 4th Ed. 569 p. 1957. John Wiley & Sons, New York. (RS403 J41c4)

Mechanism of action of various drugs. Covers the literature through April, 1956.

3185* A Simple Turbidimetric Method of Estimating Blood Urea. Hubert Lawrie. *Clinical Chemistry*, v. 3, Dec. 1957, p. 691-695.

Method uses a xanthydrol reagent and 50% acetic acid, and measurement of the degree of turbidity produced in 15 min. in a colorimeter using a red filter.

3186* (German.) Study of Effect of Metals on Plasma Albumin. **Untersuchung der Einwirkung von Metallen auf Plasmaeiweissstoffe. I.** Effect of Aluminium on Plasma, Albumin, Serum, and Fractions II+III. **Einfluss von Aluminium auf die Eiweisstoffe aus Plasma, Serum und die Fraktionen II+III.** J. Rejnek and F. Škvařil. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1489-1493.

Describes isolation of γ-globin of 90% purity by a very simple method.

3187* (German.) Ergot Alkaloids. **Mutterkornalkaloide. VIII.** Partial Synthesis of Some Cycloalkaloids of d-Isolysergic-, and d-Lysergic Acids. **Über die Partialsynthese einiger Cycloalkylamide der d-Isolysergsäure und *d*-Lysergsäure.** M. Semonský, V. Zikán, and Z. Votava. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1632-1636.

Obtained by means of condensation of d-isolysergic acid azide with cycloalkylamines (C_5-C_7).

3188* (Russian.) The Influence of Deoxyribonucleic Acid on the Digestion of Proteins by Trypsin. **Vliianie dezoksiribonukleinovoi kisloty na rasshcheplenie belkov tripsinom.** A. I.

Oparin, G. A. Deborin, and V. Z. Baranova. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 270-272.

Investigation of the effect of high polymeric deoxyribonucleic acid on the proteolytic process in conditions above the isoelectric point, that is, in conditions when the reaction between deoxyribonucleic acid and the ferment does not lead to precipitation.

3189 Excited States in Chemistry and Biology. C. Reid. 215 p. 1957. Academic Press, New York. (QD501 R27e)

Outlines some important physical concepts concerning molecular excitation and interaction, and applies them to chemical and biochemical situations.

3190* The Growth of Single Cells. I. *Schizosaccharomyces Pombe.* J. M. Mitchison. *Experimental Cell Research*, v. 13, Oct. 1957, p. 244-262.

Measurements were made of the growth in dry mass and volume of single cells of this fission yeast.

3191* Sustained Cell Culture. S. Graff and K. S. McCarty. *Experimental Cell Research*, v. 13, Oct. 1957, p. 348-357.

Gas exchange, introduction of nutrients, and removal of waste products can be regulated in a new device for continuous sustained culture of cells in suspension.

3192 Electrophoretic Studies on Bacteria. IV. The Cation Charge Reversal Spectra of Spores and Cells of *B. Megatherium*, *B. Cereus*, and *B. Subtilis*. H. W. Douglas and F. Parker. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1494-1499.

3193 The Interaction of Silicic Acid With Insulin, Albumin and Nylon Monolayers. S. G. Clark, P. F. Holt, and C. W. Went. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1500-1508.

Silicic acid reacts with insulin, albumin, and amorphous nylon over a wide pH range but monolayers are tanned only near pH 6. Tanning requires the combination of silicic acid with the protein or polyamide, and further polymerization of the adsorbed silicic acid. The roles of ionic links and H bonds are discussed.

3194* A Developmental Analysis of the Lethal Mutant L(2)GL of *Drosophila Melanogaster* Based on Cytophotometric Determination of Nuclear Desoxyribonucleic Acid (DNA) Content. Robert M. Welch. *Genetics*, v. 42, Sept. 1957, p. 544-559.

The lethal effect is ubiquitous, affecting all organs.

3195* Chemical Protection Against X-Ray Damage to Chromosomes. Herbert Parkes Riley. *Genetics*, v. 42, Sept. 1957, p. 593-600.

Protection against anaphase bridges was given by 4×10^{-4} M cysteine and cystine but not by sodium bisulfite or sodium bisulfate. Protection against the formation of interchanges and deletions was conferred by 4×10^{-3} M sodium sulfhydrate, sodium thiosulfate, sodium hydrosulfate, and sodium pyrosulfate, and 1.7 M ethanol but not by 2.8×10^{-1} glucose or 4×10^{-2} M sodium peroxydisulfate and uracil or by 2×10^{-3} M sodium bisulfite, sodium bisulfate, and tryptophan. Protection against deletions was conferred by 4×10^{-3} M sodium metabisulfite, cysteine, and cystine.

3196* Postirradiation Modification of Mutagenesis in Paramecium by Streptomycin. R. F. Kimball, Nenita Gaither, and Stella M. Wilson. *Genetics*, v. 42, Sept. 1957, p. 661-669.

Lethal and deleterious mutations in *Paramecium aurelia* can be reduced by exposure after irradiation to streptomycin only in animals irradiated during the first half of the interdivision interval and only when the treatment is started within less than an hour after irradiation. It is hypothesized that at least part of the mutational process is not completed until late interphase, and agents that retard growth reduce mutation by allowing more time for reversal to occur.

3197 Effects of Age and Mode of Ingestion on the Absorption of Plutonium. J. E. Ballou. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-52895, Oct. 1957, 9 p. (UF767 Un3.1hw Contin.)

Gastrointestinal absorption of Pu in immature rats exceeded adult absorption by as much as 85 times. The Pu deposited in a seven day-old rat had the same distribution in the skeleton, liver, and soft tissue as reported for the adult. Plutonium fed orally to adult rats was absorbed in amounts comparable to that fed by stomach tube.

3198* The Metabolism of Serine in Folic Acid Deficiency. G. B. Nadkarni and A. Sreenivasan. *Indian Academy of Sciences, Proceedings*, v. 46, sec. B, Oct. 1957, p. 236-240.

3199 Stability of Condensed Phosphates in Very Dilute Solutions. Editha Karl-Kroupa, Clayton F. Callis, and Eli Seifter. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2061-2062.

Measured half lives of tripolyphosphate in neutral, very dilute solutions at room temperature in the presence of relatively large amounts of typical higher plants, algae, fungi, and bacteria (under resting conditions) ranged from 20 to 120 hrs, as compared to the 20,000-hr. half life found for sterile and/or more highly concentrated solutions.

3200* Lysogenic Conversion and Transduction of Genetic Characters by Temperate Phage Iota in *Salmonella*. II. Lysogenic Conversion With Regard to Somatic Antigen 1 in *Salmonella* Groups A, B, and D. II. Transduction of Genetic Characters by Phage Iota in *Salmonella* Groups A, B, and D. Shoei Iseki and Kanichi Kashiwagi. *Japan Academy, Proceedings*, v. 33, no. 8, Oct. 1957, p. 481-491.

3201 The Influence of Solvents on the Bacteriostatic and Bactericidal Action of Organic Acids. E. A. Cooper and A. E. Goddard. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 613-619.

The influence of acetone and other ketonic solvents on the bacteriostatic and bactericidal action of certain organic acids, using *B. aerogenes*, was studied.

3202 Modified Method of Determining Mutation Rates in Bacteria. Norman N. Durham and Orville Wyss. *Journal of Bacteriology*, v. 74, Nov. 1957, p. 548-552.

Ultra-violet light and manganous chloride were tested for their mutagenic activity on the streptomycin resistant and threonine independent loci of two different organisms a threonine dependent strain (Texas) of *Eshcerichia coli* strain B and the Y-53 strain of *Escherichia coli* strain K-12.

3203 Numbers of Enterococci in Water, Sewage, and Feces Determined by the Membrane Filter Technique With an Improved Medium. L. W. Slanetz and Clara H. Bartley. *Journal of Bacteriology*, v. 74, Nov. 1957, p. 591-595.

3204 Studies on the Milky Disease Organisms. I. Parasitic Growth and Sporulation of *Bacillus popilliae*. II. Saprophytic Growth of *Bacillus popilliae*. Keith H. Steinkraus. *Journal of Bacteriology*, v. 74, Nov. 1957, p. 621-632.

3205 A New Species *(Flavobacterium Polyglutamicum)* Which Hydrolyzes the γ-L-Glutamyl Bond in Polypeptides. B. E. Volcani and P. Margalith. *Journal of Bacteriology*, v. 74, Nov. 1957, p. 646-655.

An organism which utilizes γ-poly-DL-glutamic acid produced by *Bacillus subtilis*, was isolated from soil. It specifically splits the γ-linked glutamic acid of the L-configuration in the polypeptide and is able to split glutamic acid residues in pteroly-γ,γ-triglutamate, pteroly-γ-heptaglutamate, *p*-aminobenzoyl tri- and polyglutamic acids.

3206 Analysis of Leukocytic Extracts From Guinea Pigs Hypersensitive to Tuberculin and 2,4-Dinitrochlorobenzene. W. S. Jeter, K. A. Laurence, and P. M. Seebohm. *Journal of Bacteriology*, v. 74, Nov. 1957, p. 680-683.

A new electrophoretic component resembling an α-1-globulin was found in high concentration in cells from sensitive donors, which was lacking in normal cells. Positive passive transfer reactions were demonstrable with aliquot portions of more than 70% of extracts analyzed.

3207* The Fine Structural Organisation of Rous Tumour Cells. M. A. Epstein. *Journal of Biophysical and Biochemical Cytology*, v. 3, no. 6, Nov. 1957, p. 851 + 10 pages and 4 plates.

The fibroblast-like tumor cells of Rous sarcomata have been studied in thin sections with the electron microscope.

3208* The Ribonucleoprotein Nature of Large Particles in the Meiosporangia of Allomyces. Edward S. Rorem and Leonard Machlis. *Journal of Biophysical and Biochemical Cytology*, v. 3, no. 6, Nov. 1957, p. 879-888 + 1 plate.

The relation of chromospheres to postmeiotic chromospheres and nuclear caps is discussed.

3209* Studies on the Biosynthesis of Collagen. I. The Growth of Fowl Osteoblasts and the Formation of Collagen in Tissue Culture. II. The Conversion of ^{14}C-L-Proline to ^{14}C-Hydroxyproline by Fowl Osteoblasts in Tissue Culture. R. H. Smith and Sylvia Fitton Jackson. *Journal of Biophysical and Biochemical Cytology*, v. 3, no. 6, Nov. 1957, p. 897-922 + 1 plate.

3210* Inactivation of Poliomyelitis Virus for the Preparation of Vaccines. I. Formalin and Ultraviolet Irradiation. A. R. Taylor, W. W. Kay, E. A. Timm, A. E. Hook, and I. W. McLean, Jr. *Journal of Immunology*, v. 79, Oct. 1957, p. 265-275.

With a formalin-ultraviolet combination it was found that reliable inactivation of poliomyelitis virus may be obtained rapidly and consistently.

3211* Antibody Response of Mice Treated With 2-Mercaptoethylguanidine Hydrobromide and Lethal Doses of X-Radiation, and Its Significance to the Relation of Antigen to Host. Takashi Makinodan, Isabel C. Shekarchi, and Charles C. Congdon. *Journal of Immunology*, v. 79, Oct. 1957, p. 281-287.

3212 Chemotherapeutic Search for Amoebicides. S. P. Popli and B. Mukerji. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Oct. 1957, p. 440-450.

Reviews the chemotherapy of amoebiasis mainly from the chemical point of view, and indicates the lines along which research has progressed in the synthesis of known amoebicides and the newer compounds based on the structure of known and proven drugs.

3213 Biological Effects of Pressure Phenomena Occurring Inside Protective Shelters Following a Nuclear Detonation. C. S. White, et al. *Operation Teapot (U. S. Atomic Energy Commission)*, WT-1179, Oct. 1957, 219 p. (UF767 Un3.1wt Contin.)

In two series of experiments 277 experimental animals were exposed under selected conditions in six different general types of instrumented above- and below-ground shelters to blast produced by nuclear explosions. All animals were recovered, examined, sacrificed, and subjected to gross and microscopic pathological study.

3214 Pharmaceutical Calculations. Willis T. Bradley, Carroll B. Gustafson, and Mitchell J. Stoklosa. 3rd Ed. 325 p. 1957. Lea & Febiger, Philadelphia. (RS57 B72p)

A textbook concerning the arithmetic of today's applied pharmacy.

3215* Recessive Lethal Mutation Induced in the Mouse by Chronic γ-Irradiation. T. C. Carter. *Royal Society, Proceedings*, v. 147, ser. B, Dec. 3, 1957, p. 402-411.

Data from an experiment in which mouse sperm were exposed to low accumulated doses of radium γ-radiation lead to an estimate of one recessive lethal per 300 r.

3216 Apparent Shifts of Absorption Bands of Cell Suspensions and Selective Light Scattering. Paul Latimer. *Science*, v. 127, Jan. 3, 1958, p. 29-30.

Optical effect described can distort the positions and shapes of absorption bands of cells and their components. Some spectra of cells may show the influence of this effect.

3217 Effect of Reserpine and Promazine on Diphosphopyridine Nucleotide Synthesis in Liver. Robert Main Burton, Nathan O. Kaplan, Abraham Goldin, Milton Leitenberg, Stewart R. Humphreys, and Mary Ann Sodd. *Science*, v. 127, Jan. 3, 1958, p. 30-31.

Injection of nicotinamide into mice results in large increases of the levels of diphosphopyridine nucleotide (DPN) in tissue. Administration of reserpine and promazine prior to the injection results in the level of DPN in the liver being maintained at an elevated concentration for a prolonged period.

3218 Purification and Properties of an Interstitial Cell-Stimulating Hormone From Sheep Pituitaries. Phil G. Squire and Choh Hao Li. *Science*, v. 127, Jan. 3, 1958, p. 32.

The activity of β-ICSH was estimated by its ability to increase the weight of the ventral prostate in hypophysectomized rats.

3219 The Indestructible Hydra. N. J. Berrill. *Scientific American*, v. 197, Dec. 1957, p. 118 + 5 pages.

This tiny fresh-water animal can be cut into as many as eight pieces, each of which then grows into a complete individual. Recent studies have illuminated how it grows and regenerates.

3220* Inhibitory Influence of a Normally Occurring Pyrimidine Precursor Upon Methylcholanthrene Carcinogenesis. Stanfield Rogers. *Society for Experimental Biology and Medicine, Proceedings*, v. 96, Nov. 1957, p. 464-465.

Increasing the intake of orotic acid reduced the carcinogenic influence of methylcholanthrene in mice.

3221* The Toxicity of Arsenical Compounds to Microorganisms. Robert A. Zabel and Frederic W. O'Neil. *Tappi*, v. 40, Nov. 1957, p. 911-914.

Of 44 arsenicals evaluated for microbial activity, silver cacodylate, 8-hydroxy-quinoline arsanilate, and 8-hydroxyquinoline methyl arsonate indicated considerable bactericidal or fungicidal effectiveness.

3222 The Preparation of C^{14}-Pyrimethamine. Arthur Murray, III. *University of California, Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2145, Nov. 1957, 9 p. (UF767 U3La Contin.)

The antimalarial drug pyrimethamine was synthesized and labeled with C^{14} for use in studies on its metabolic fate in lower animals. The over-all yield was 58% based on $BaCO_3$-C^{14}.

3223 Some Effects of Radiations on Cell Proliferation. Cornelius A. Tobias. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3735, Aug. 1957, 11 p. (UF767 U3u Contin.)

Radiation damage in diploid yeast cells manifests itself sometimes in delayed lethal effect and decreased cell division rate over several generations in the progeny of the irradiated cell. Recovery of the progeny of irradiated yeast cells from phenotypic expression of radiation damage can be delayed over many generations and is similar, in time rate of onset, to the onset of radiation-induced animal tumors.

3224 Evolution of Enzymes and the Photosynthetic Apparatus. Melvin Calvin. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3915, Aug. 1957, 12 p. (UF767 U3u Contin.)

A mechanism is proposed for the development of rudimentary catalytic functions into efficient ones leading to enzymes.

3225 A Study of the Deposition of a Submicronic Aerosol in Human Subjects. P. E. Morrow, E. Mehrhof, L. J. Casarett, and D. A. Morken. *University of Rochester, Atomic Energy Project (U. S. Atomic Energy Commission)*, UR-504, Nov. 1957, 41 p. (UF767 Un3.1ru Contin.)

An inhalation study in human subjects. A submicronic NaCl aerosol was used and characteristics of both the aerosol and of the subjects' breathing were analyzed in terms of deposition measurements.

3226* An Application of Ion Exchange Chromatography to the Identification of Virus Activity With Characteristic Particles. John R. Shainoff and Max A. Lauffer. *Virology*, v. 4, Dec. 1957, p. 418-434.

A chromatographic procedure, frontal analysis using a strongly basic anion exchange resin, was developed as a means for identifying an infectious entity with a characteristic particle. The retention of Southern bean mosaic virus nucleoprotein by the resin was studied as functions of pH, ionic strength, and concentration.

3227* The Primary Interaction of Poliomyelitis Virus With Host Cells of Tissue Culture Origin. John G. Bachtold, H. Curt Bubel, and Louis P. Gebhardt. *Virology*, v. 4, Dec. 1957, p. 582-589.

The inorganic salts $CaCl_2$ and $MgCl_2$ promoted the attachment of poliomyelitis virus to monkey kidney tissue culture cells in suspension. The rate of virus attachment was found to be dependent on the concentration of these salts.

See also: **3131** (sucrose biosynthesis); **3313** (determination of vitamin A); **3336** (C^{14} steroids on paper chromatograms); **3338** (paper chromatographic analysis of amino acids); **3341** (dyeing of serum proteins); **3359** (determining serum protein-bound iodine); **3441** (carbohydrate chemistry); **3934** (bacteria colony counter).

CERAMICS AND CONCRETE

3228* (English.) **The Cation-Exchange Capacity of Hungarian Bentonites and the Exchange Process When Treated With Soda.** J. Barna. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 325-338.

Cation-exchange capacity values for Hungarian and foreign bentonites, established since 1951, are classified according to the abundance of cations.

3229* (English.) **Modern Methods for Studying Clays.** Robert C. Mackenzie. *Agrochimica*, v. 1, no. 4, Sept. 1957, p. 305-327 + 4 plates.

Chemical and optical methods; electron microscopy; X-ray and electron diffraction; thermal and infra-red absorption techniques.

3230* (Russian.) Electrical Conductivity of Molten Sodium-Calcium-Magnesium-Aluminum-Silicate Glasses. **Elektroprovodnost' natrii-kal'tsii-magnii-aliumosilikatnykh stekol v rasplavlennom sostoianii.** K. A. Kostanian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 4, 1957, p. 237-245.

Electrical conductivity of the above glasses depending on their composition and temperature.

3231* (Russian.) Dielectric Polarization and Loss in Aluminum Phosphate Glasses. **Dielektricheskaia poliarizatsiia i poteri v aliumofosfatnykh steklakh.** V. P. Petrosian. *Akademiia Nauk Armianskoi SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 4, 1957, p. 247-255.

Study of the role of aluminum oxide, and behavior of various metallic ions in glass by investigation of temperature and frequency dependence of dielectric properties.

3232 Characterization of Sinterable Oxide Powders. I. BeO. J. F. Quirk, N. B. Mosley, and W. H. Duckworth. *American Ceramic Society, Journal*, v. 40, Dec. 1957, p. 416-419.

Different BeO powders made from analyzed hydroxides showed a wide range of sinterability. The temperatures required for sintering the powder compacts to theoretical density ranged from 2300 to above 3200 F. Lattice parameters, thermal decomposition, surface areas, and refractive indices were determined on these powders after calcination in air at 750, 1470, 1830, and 2190 F. No simple relation between sinterability and these characteristics was found.

3233 Predicting the Thermodynamic Stabilities and Oxidation Resistances of Silicide Cermets. Alan W. Searcy. *American Ceramic Society, Journal*, v. 40, Dec. 1957, p. 431-435.

Silicides with oxidation-resistance characteristics similar to $MoSi_2$ can be expected only among the high-Si-content phases of a small group of elements; silicide cermets of greatest oxidation resistance should result from mixtures of $MoSi_2$, SiC, or Si_3N_4 with those elements.

3234* (Russian.) Investigation of Wear Qualities of Finished Hydraulic Concretes. **Issledovanie oblitsovochnykh gidrotekhnicheskikh betonov na iznos.** V. Ia. Gorenbein. *Beton i Zhelezobeton*, 1957, no. 10, Oct., p. 413-415.

Determination of predominant causes in wearing away of finished concrete, and an attempt to eliminate them.

3235 Some Properties of Refractory Non-Stoicheiometric Oxides. W. J. Kramers and J. R. Smith. *British Ceramic Society, Transactions*, v. 56, Nov. 1957, p. 590-607 + 5 plates.

Formation and properties of various oxides; effect of additional components on chemical structure and hardness. Fabrication of ThO_2, Cr_2O_3, and ZrO_2 compositions. Experiments on high-temperature chemical reactivity with molten Ti and air.

3236 Sepiolite. A Versatile Raw Material. Robert H. S. Robertson. *Chemistry & Industry*, 1957, no. 46, Nov. 16, p. 1492-1495.

Crystal structure, applications, and properties. Chief advantages over other minerals are low density, high specific surface, and exceptional filtration properties for percolation processes.

3237* (Russian.) Elastic Properties of Glass. **Ob uprugikh svoistvakh stekla.** E. K. Keler and E. I. Kozlovskaia. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 221-224.

New experimental data on change of elastic properties of glass during torsion in relation to temperature. Experimental curves of instant-elastic, delayed-elastic, and residual deformations.

3238 The Discrete Ion Theory and Viscous Flow in Liquid Silicates. J. D. Mackenzie. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1488-1493.

Viscosity measurements were made on the ternary liquid silicate systems $Li_2O + Na_2O + SiO_2$, $Na_2O + K_2O + SiO_2$, $Na_2O + CaO + SiO_2$, and $Na_2O + BaO + SiO_2$ over the temperature range 900-1400 C, using a Pt counterbalanced viscometer.

3239 Recent Work on the Flaking of Refractories. J. H. Wylde. *Gas Council, Research Communication* GC40, Nov. 1957, 36 p. (TP700 G21.2r Vis.)

Two dissimilar types of refractory bricks, both with high strength, and with zero and extremely low apparent porosity and permeability respectively, were found to resist flaking and distortion in shape under service conditions.

3240 Fabrication and Enclosure of Uranium Dioxide. E. A. Evans. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-52729, Sept. 1957, 35 p. (UF767 Un3.1hw Contin.)

Reduced costs and improved quality of high density UO_2 compacts have been made possible by new powder treatments and fabrication techniques. Typical recent developments are powder activation by reduction in a fluidized bed, combined powder compaction and cladding by swaging, without subsequent sintering, and finishing of sintered ware by belt centerless grinding.

3241* (Czech.) Basic Lining of Electric-Arc Furnaces Producing Low-Carbon Steels. **Zásaditá vyzdívka elektrických obloukových pecí vyrábějících nerezavějící ocele s nízkým obsahem unlíku.** Jaroslav Dobrý *Hutnické Listy*, v. 12, no. 10, Oct. 1957, p. 907-913.

Laboratory and plant scale investigation of a magnesite raw mix bonded by $MgCl_2$. Composition, production, and properties of the lining material.

3242* (French.) The Transportation of Slips by Means of Pumps. **Transport des barbotines par pompage.** P. Draignaud. *Industrie Céramique*, 1957, no. 490, Oct., p. 285-288.

Characteristics of centrifugal pumps, including flow velocity, frictional losses, and other considerations.

3243* (French.) Using City Gas to Fire Glazed Earthenware. **L'utilisation du gaz de ville pour la cuisson des faiences.** R. Prévot. *Industrie Céramique*, 1957, no. 490, Oct., p. 289-296.

Behavior of pastes and enamels in a direct-fired furnace. Effects of atmosphere composition and speed of firing; economic advantages.

3244* (French.) Refractoriness of the Serpentine-Dolomite System. **Réfractarité du système serpentine-dolomie.** Al. Braniski. *Industrie Céramique*, 1957, no. 491, Nov., p. 319-329.

From an analysis of melting points in the CaO-MgO-SiO_2 system, conclusions are drawn concerning the refractoriness of dolomitic, merwinitic, and forsteritic products.

3245* (Spanish.) Quantitative X-Ray Analysis of Mixtures of Silica Modifications. **Sobre el analisis roentgenografico cuantitativo de mezclas de las modificaciones de la silice.**

Maria del Carmen Sanchez Conde and E. A. Jumpertz. *Instituto del Hierro y del Acero*, v. 10, no. 53, July-Sept. 1957, p. 278-283.

Quantitative study of mixtures of quartz, tridymite, and cristobalite; application to determining modifications in silica bricks.

3246 Crystallographic and Magnetochemical Studies on ABO_3 Group Compounds of Lanthanon and manganese Oxides. R. C. Vickery and Ardys Klann. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1161-1163.

Perovskite-structured compounds were prepared containing magnanese oxide with praseodymium, neodymium, and dysprosium oxides. X-ray crystallograhpic data were obtained for these compounds, and unit cell edge values of 3.82, 3.80, and 3.70 A are found for $PrMnO_3$, $NdMnO_3$, and $DyMnO_3$, respectively.

3247 The Capillary Cohesion of Granules. J. M. Conway-Jones. *Imperial College Chemical Engineering Society, Journal*, v. 10, 1956, p. 66-84. (TP1 Im7j Vis.)

A relation is derived for the strength of a granule in terms of the capillary forces producing cohesion.

3248* Some Factors Affecting the Surface Area of Hydrated Portland Cement as Determined by Water-Vapor and Nitrogen Adsorption. L. A. Tomes, C. M. Hunt, and R. L. Blaine. *Journal of Research, National Bureau of Standards*, v. 59, Dec. 1957, p. 357-364.

3249 Melting Points & Certain Phase Relationships in the System Magnesium Orthosilicate-Magnesium Orthotitanate-Magnesium Ferrite. M. Ramakrishna Rao. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 444-451.

3250 Casting of Magnesium Oxide in Aqueous Slips. S. D. Stoddard, D. T. Doll, and J. M. Taub. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-1846, Nov. 1957, 47 p. (UF767 U3La Contin.)

Fused MgO, after wet ball milling and aging, forms a slip in water. Both drain and solid castings were produced.

3251 (Hungarian.) A Study of the Conditions of Formation of Lithium Aluminum Silicates. **Litiumalumíniumszilikátok képződési viszonyainak vizsgálata.** Rezsőné Moldvai. *Magyar Kémiai Folyóirat*, v. 63, no. 10, Oct. 1957, p. 275-283.

Determination of compositions with linear thermal expansion in the system Li_2O-Al_2O_3-SiO_2. Investigation of reactions between solid raw materials in the samples.

3252 Radioactive-Tracer Technique for Studying Grinding Ball Wear. M. Pobereskin, N. M. Ewbank, Jr., G. D. Calkins, A. Wesner, and J. E. Campbell. *Mining Engineering*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 208, Dec. 1957, p. 1356-1358.

Describes a technique for recovery and separation of steel grinding balls and subsequent evaluation of the various compositions of the balls. The procedure involves thermal-neutron irradiation activation of each group of test balls to a different level of specific radioactivity, addition of groups of the radioactive balls into a ball mill, recovery of the radioactive specimens from the bulk of the mill charge, separation of the various groups by their specific radioactivity, and evaluation of actual grinding ball wear.

3253 Portland Cement Association Research and Development Laboratories, Bulletins 64-83, 1956-57. Sections individually paged. Portland Cement Assn., Chicago. (TP883 P83b Vis.)

Collection of miscellaneous reports on properties, structure, and testing of cement and concrete.

3254* (Polish.) The Corrosion Resistance of Polish Carbon Construction Materials in Aqueous Solutions of Several Sulfites. **Odporność krajowych tworzyw węglowych na korozję w ośrodku wodnych roztworów niektórych siarczynów.** S. Pawlikowski, I. Pollo, and E. Bonarek. *Przemysł Chemiczny*, v. 13, no. 11, Nov. 1957, p. 669-672.

Process of manufacturing C products is described with results of experiments on the resistance of these products in aqueous solutions of ammonium and other sulfites.

3255* (German.) The Diffraction of Light Produced by Ultrasonic Waves in Optical Glasses for the Determination of Elastic Constants. **Über die Lichtbeugung an Ultraschallwellen in optischen Gläsern zur Bestimmung ihrer elastischen Konstanten.** Karl Schilling. *Silikattechnik*, v. 8, no. 10, Oct. 1957, p. 423-433.

The elastic constants of optical glass can be determined with great accuracy by a single diffraction picture taken from the diffraction distances, when light falls in a perpendicular direction upon a sound wave. The diffraction pictures with a cross type lattice arrangement of the diffraction points are best suited for this purpose.

3256* (German.) Studies of the Influence of Increased Drying Temperatures Upon Some Ceramic Properties of Clays. **Untersuchungen über den Einfluss erhöhter Trockentemperaturen auf einige keramische Eigenschaften von Tonen.** Hans-Georg Schwaz. *Silikattechnik*, v. 8, no. 10, Oct. 1957, p. 436-439.

During the drying of three bond clays between 212 and 752 F it was shown that the dry modulus of rupture, dry shrinkage, and viscosity of slips decrease with an increase of the drying temperature from 302 to 482 F.

3257* The Relation of the Viscosity of Glasses to Load, Temperature, and Time in the Range 10^9-10^{13} Poises. I. M. Watanabe and R. Koyama. *Society of Glass Technology, Journal*, v. 41, no. 199, Apr. 1957, p. 137T-156T.

Soda-lime-silica and borosilicate glasses were studied by a fiber-elongation method.

3258* (Russian.) The Effect of Alkalis on the Clinker Forming Process and the Stability of Cement. **Vliianie shchelochey na protsess klinkeroobrazovaniia i prochnost' tsementa.** Iu. M. Butt, V. V. Myshliaeva, and T. A. Osokina. *Tsement*, v. 23, no. 5, Sept.-Oct. 1957, p. 9-14.

Structure of clinkers in the presence of alkali and its effect on cement stability.

3259* (Russian.) Hardening Processes and Technical Properties of Magnesia Refractory Material Used in Lining Rotary Furnaces. **Protsessy tverdeniia i tekhnicheskie svoistva magnezial'nogo ogneupornogo rastvora dlia futerovok vrashchaiushchikhsia pechei.** Ia. V. Kliucharov and N. V. Meshalkina. *Tsement*, v. 23, no. 5, Sept.-Oct. 1957, p. 14-19.

Chemistry of the hardening of magnesia materials. Effects of water glass, grain composition, and storage conditions.

3260* (Russian.) Certain Problems in High Temperature Clinker Production. **Nekotorye voprosy vysokotemperaturnoi tekhnologii proizvodstva klinkera.** G. S. Valberg. *Tsement*, v. 23, no. 5, Sept.-Oct. 1957, p. 20-23.

Study of the sintering process in the range from 1600 to 1800 C.

3261 Properties of UO_2. J. Belle and B. Lustman. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-184, Sept. 1957, 140 p. (UF767 Un3.1wa Contin.)

Sintering characteristics; physical properties; the system UO_3-U_3O_8; stability of UO_2 in water; self-diffusion kinetics.

3262* (German.) The Microhardness of Glass Surfaces. **Über die Mikrohärte von Glasoberflächen.** Peter Joos. *Zeitschrift für Angewandte Physik*, v. 9, no. 11, Nov. 1957, p. 556-561.

Surface-scratching tests were compared for glasses when the scratch process takes place in a wet atmosphere or in a high vacuum. A plastic deformation results in the first case, a pure embrittlement in the second.

3263* (Russian.) Some Studies on Li-Zn Ferrites. **Nekotorye issledovaniia v oblasti Li-Zn ferritov.** Kh. S. Valeev, N. G. Drozdov, and A. L. Frumkin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2517-2527.

Investigation of sintering behavior and magnetic properties.

3264* (Russian.) Non-Seignettoelectrical Phase Transitions in Solid Solutions in the $(Ca,Sr)(Ti,Zr)O_3$ and $Na(Nb,Ta)O_3$ Systems. **Nesegnetoelektricheskie fazovye perekhody v tverdykh rastvorakh, obrazuiushchikhsia v sistemakh $(Ca,Sr)(Ti,Zr)O_3$ i $Na(Nb,Ta)O_3$.** G. A. Smolenskii, V. A. Isupov, A. I. Agranovskaia, and E. D. Sholokhova. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2528-2534.

See also: **3431** (action of H_2O on B-Ca_2SiO_4); **3570** (spectral emission from SiC heating elements); **3581** (system U-O); **4053** (maintenance of steel plant refractories); **4063** (wear of blast-furnace lining); **4177** (use of ceramic cutting tools); **4265** (specific surface vs. particle size of oxide powders); **4427** (effects of irradiation on UO_2).

CHEMICAL ENGINEERING

3265* Evaluation of the Use of Polyphosphates in the Water Industry. Thurston E. Larson. *American Water Works Association, Journal*, v. 49, Dec. 1957, p. 1581-1586.

Data on use in cleaning wells, iron removal, scale and corrosion prevention, and cleaning of water mains.

3266* (German.) Ice Zone Melting. New Method for the Concentration of Very Small Quantities of Materials From Aqueous Solutions. **Eis-Zonenschmelzen. Neue Methode der Anreicherung geringster Substanzmengen aus wässriger Lösung.** H. Schildknecht and A. Mannl. *Angewandte Chemie*, v. 69, no. 20, Oct. 21, 1957, p. 634-638.

The well known procedure of fusion of inorganic or organic solids, which is employed for the separation and concentration of minute by-products at one end of the test material, is analogically applied to liquids.

3267* (German.) The Hydration of Ethylene and Propene. **Die Hydration von Äthen und Propen. I.** The Hydration of Ethylene. **Die Hydratation von Äthen.** J. Muller and H. I. Waterman. *Brennstoff-Chemie*, v. 38, nos. 21-22, Nov. 1957, p. 321-329.

Effect of reaction conditions on hydration within the temperature range 200 to 290 C, pressure range 10 and 50 atm., the molar relationship C_2H_4/H_2O between 0.5 and 6.5, and the velocity of flow between 3000 and 12,500 l. of gas/l. catalyst/hr.

3268* Designing Azeotropic Distillation Columns. S. R. M. Ellis and C. J. Pearce. *British Chemical Engineering*, v. 2, Dec. 1957, p. 648-653.

Methods for the design as applied to the system ethyl acetate-acetic acid-water.

3269* Extraction Calculations. A Comparison of Graphical and Analytical Methods. D. S. Davis. *British Chemical Engineering*, v. 2, Dec. 1957, p. 662-663.

Two graphical methods, which employ different scales for solute concentration, are compared with the rigorous analytical method.

3270* Ammonium Nitrate and Related Fertilisers. L. S. Greenslade. *British Chemical Engineering*, v. 2, Dec. 1957, p. 664-666.

Reviews the earlier methods of manufacture and discusses the modern continuous process based upon the neutralization of NH_3 and HNO_3.

3271* M. E. R. L.'s New Heat-Transfer Laboratory. *British Chemical Engineering*, v. 2, Dec. 1957, p. 668-669.

Plant details; laboratory services; research program.

3272* Application of Automatic Process Control to Chemical Engineering. V. Response of Complex Process Stages. N. J. Hassett. *British Chemical Engineering*, v. 2, Dec. 1957, p. 670-673.

3273 Summarized Proceedings of a Meeting on Low Temperature Distillation—London, March, 1957. F. Din. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 436-441.

3274 Development of an Agitated Trough Continuous Calciner. M. J. Szulinski. *Chemical Engineering Progress*, v. 53, Dec. 1957, p. 586-589.

A troublesome and costly step in the purification of U is simplified by development of a practical continuous trough for the calcination of uranyl nitrate hexahydrate.

3275 Improved Heat Transfer System for Freeze-Drying. Ira M. Abelow and Earl W. Flosdorf. *Chemical Engineering Progress*, v. 53, Dec. 1957, p. 597-600.

Practical methods for obtaining shorter cycles and more uniform temperature conditions in the bulk freeze-drying of sensitive materials.

3276* (German.) Investigations Into the Recovery of Potassium Chloride From Raw Potassium Salts by Crystallization. **Untersuchungen über die Gewinnung von Kaliumchlorid aus Kalirohsalzen durch Kristallisation.** Hans Autenrieth, Heinz Rieke, and Hanspeter Dust. *Chemie-Ingenieur-Technik*, v. 29, no. 11, Nov. 1957, p. 709-721.

Experiments to produce coarse crystals on the basis offered by multi-stage vacuum cooling plants with agitated evaporators.

3277* (German.) Preparation of Fluorspar. **Flussspataufbereitung. II.** Synthetic Cryolite From Raw and Waste Fluorspar Rich in Silicic Acid. **Synthetischer Kryolith aus kieselsäurereichen Roh- und Abfall-Flussspaten.** A. Bienert. *Chemie-Ingenieur-Technik*, v. 29, no. 11, Nov. 1957, p. 721-726.

Process is characterized by the combination of a wet decomposition stage taking place in a liquid medium and a dry decomposition stage using concentrated hot H_2SO_4.

3278* (German.) Separation of Liquid Mixtures by Partial Distillation. **Trennung von Flüssigkeitsgemischen durch teilweise Destillation.** Reinhard Billet. *Chemie-Ingenieur-Technik*, v. 29, no. 11, Nov. 1957, p. 733-742.

Relationships are given for the calculation and mathematical presentation of the distillation process in the thin-film evaporator.

3279* (German.) Production and Purification of Blue Vitriol. **Herstellung und Reinigung von Kupfervitriol.** Friedrich Vogel. *Chemiker-Zeitung*, v. 81, no. 21, Nov. 5, 1957, p. 705-707.

To eliminate the impurities contained in the crude solution for producing blue vitriol, the use of an intermediate precipitation of Cu in sulfate form is suggested. The latter, as a marketable product, may replace the crystals of blue vitriol.

3280* (Italian.) O-Ethyl-Cyclohexanone-Oxime, Ethyl-ε-Caprolactam, and Mixed Polymers With Caprolactam. **Ortoetilicicloesanonossima, etil-ε-caprolattame e polimeri misti con caprolattame.** F. Somlò, G. Lemetre, U. Giolitti, A. Marabini, and S. Pierucci. *Chimica e l'Industria*, v. 39, no. 11, Nov. 1957, p. 905-912.

Preparation and properties.

3281 Experiments on the Production of Peak-Load Gas From Methanol and Light Petroleum Distillate. R. G. Cockerham and G. Percival. *Gas Council, Research Communication* GC41, Nov. 1957, 36 p. (TP700 G21.2r Vis.)

Laboratory experiments indicating the possibility of producing town gas from methanol by a catalytic process that should be specially suitable for peak loads. Process would operate under pressure without using O and would permit high outputs from plant units of simple design.

3282* (French.) Considerations on the Operation of "Autothermal" Reactors. **Considérations sur la marche des réacteurs autothermes.** E. Mertens de Wilmars. *Génie Chimique (Supplement to Chimie & Industrie)*, v. 78, no. 4, Oct. 1957, p. 93-101.

Design, construction, and operation of reactors which automatically set their own temperature level.

3283 Dualayer Gasoline Process to Remove Mercaptans. Bruce F. Greek, Claiborne A. Duval, and V. A. Kalichevsky. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1938-1944.

Process utilizes cresylic acid, actually a mixture of *o*-,*m*-, and *p*-cresols and phenol, to increase the solubility of mercaptans in alkaline solution. The gasoline treating solution, a mixture of potassium hydroxide, potassium cresylate, and water, is regenerated by steam stripping.

3284 Heat Transfer in a High Pressure Reactor. Leon N. Vernon and C. M. Sliepcevich. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1945-1948.

Heat transfer and fluid flow were studied in a new type of high pressure tubular reactor, which utilizes a machined helix between the liner and body for passage of a heating or cooling fluid.

3285 Liquid Nitrogen Pump and Vaporizer. G. A. Bleyle, Jr., H. W. Crosby, and R. E. Kendall. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1955-1958.

To satisfy a need for dry, oil-free gaseous N at pressures up to 10,000 psi. a reciprocating piston pump using unlubricated packing at −320 F was selected.

3286 Compressing of Gases in the Pure State to High Pressures. R. C. Wolf and J. C. Bowen. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1962-1964.

Pressures up to 30,000 psi. were reached by the method of hydraulically moving a thin metallic diaphragm to displace the gas.

3287 Isomer Distribution in the Oxo Reaction. V. L. Hughes and Isidor Kirshenbaum. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1999-2003.

Temperature and type of olefin have the greatest influence on isomer product distribution, low temperature and terminal olefins favoring formation of the straight-chain product.

3288 Batch Hydrogenolysis Reactions of Pure Compounds Related to Petroleum Oils. E. B. Shultz, Jr. and H. R. Linden. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2011-2016.

Reactions of C_6 to C_{12} normal paraffins, C_6 cyclic hydrocarbons, and C_{10} condensed ring hydrocarbons were studied at an initial H pressure of 1275 lbs. per sq. in. gage and a hydrogen-hydrocarbon ratio of 0.07 lb. mole per lb.

3289 A Plant-Scale Unit for Distillation Tray Research. Earl Manning, Jr., Stanley Marple, and G. P. Hinds, Jr. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2051-2054.

A short refinery column, 5-ft. in diameter, was equipped and instrumented for a wide range of operating conditions. An isooctane-toluene test system was used in most of the work because of its availability, ease of analysis, and proper relative volatility.

3290 The Absorption Cooling Process. R. T. Ellington, G. Kunst, R. E. Peck, and J. F. Reed. *Institute of Gas Technology Research Bulletin* 14, Aug. 1957, 44 p. (TP700 In7r Contin.)

Results of an extensive search of literature on the theory of the closed absorption cycle; applications of the cycle. The chemical and thermodynamic properties of absorbents and refrigerants and factors to be considered in attempts to develop improved absorbent-refrigerant combinations are presented.

3291 The Manufacture of Naphthalene of Crystallizing Point 78°. T. G. Woolhouse. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 573-583.

A discussion of commercial methods.

3292 Calendering of a Viscoelastic Material. P. R. Paslay. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 602-608.

The solution of the calendering problem for viscous materials is extended to include the first effects of elasticity. A numerical procedure for the solution of the approximate equations is given.

3293 Flocculation, Subsidence, and Filtration of Phosphate Slimes. V. The Optimum Filtration Rate as a Function of Solid Content and Specific Area. Victor K. LaMer, Robert H. Smellie, Jr., and Pui-Kum Lee. *Journal of Colloid Science*, v. 12, Dec. 1957, p. 566-574.

3294 Some Properties of Gas Fluidised Systems. A. G. Bakhtiar. Paper from "Journal of the Imperial College Chemical Engineering Society". v. X. 1956. p. 85-97. (TP1 Im7j Vis.)

Factors influencing the uniformity of fluidization and the flow patterns. Rates of heat and mass transfer. Chemical reactions within the system.

3295 The Production of Liquid Parahydrogen. W. Ball. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2137, Nov. 1957, 53 p. (UF767 U3La Contin.)

Development of a refrigerator which absorbs energy at 20.4 K. An attempt is made to produce the refrigeration as reversibly as possible and to employ it in the manufacture of liquid parahydrogen.

3296 Silencer for a Cat Cracker. R. N. Lane. *Noise Control*, v. 3, Nov. 1957, p. 49-50.

3297 Nuclear Chemical Engineering. Manson Benedict and Thomas H. Pigford. 594 p. 1957. McGraw-Hill, New York. (TK9145 B43n)

The materials of importance in nuclear reactors and the novel processes which have been developed to concentrate, purify, and separate these materials.

3298 Hydraulic Cyclones for Application to Homogeneous Reactor Chemical Processing. P. A. Haas. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2301, Nov. 1957, 36 p. (UF767 U3o Contin.)

Application of liquid cyclones to removal of 1 to 10μ particles from aqueous streams.

3299 Catalyst Erosion in Cat Crackers. Larry Resen. *Oil and Gas Journal*, v. 55, Dec. 9, 1957, p. 101-103.

Case histories of its control.

3300 Making Butadiene. III. Butane Dehydrogenation Today Employs Fixed Bed Methods. IV. Feed Preparation and Finishing. John C. Reidel. *Oil and Gas Journal*, v. 55, Dec. 9, 1957, p. 144 + 6 pages; Dec. 16, 1957, p. 110 + 5 pages.

The steam-dilution method for butylene dehydrogenation, the Houdry adiabatic process, and the Phillips isothermal process are the methods currently being used. Future methods may employ fluid-bed and moving-bed techniques. Close volatilities of the C_4's make their separation difficult. One process scheme employs acetone or acetonitrile extractive distillation for the feed preparation and extraction with cuprous ammonium acetate for butadiene recovery.

3301 Which CO_2 Removal Is Best? J. F. Mullowney. *Petroleum Refiner*, v. 36, Dec. 1957, p. 149-152.

An economic comparison of seven different processing schemes for removing CO_2 from gas streams.

3302 Calculate Heater Tube Temperatures. A. Doll-Steinberg. *Petroleum Refiner*, v. 36, Dec. 1957, p. 165-169.

This method for calculating maximum tube-wall temperatures aids in the selection of tube material and wall thickness.

3303* (Polish.) Dehydration of Sodium Sulphate in the Rayon Industry by Means of a Submerged Burner. **Odwodnienie soli glauberskiej z przemysłu włókien sztucznych za pomoca palnika nurnikowego.** L. Leśniewicz and J. Pysiak. *Przemysł Chemiczny*, v. 13, no. 11, Nov. 1957, p. 639-642.

In experiments on dehydrating, the following principal parameters of the process were determined: granulation of the product, curves of sedimentation of sodium sulfate in hot saturated solutions of the salt, and the approximate amount of heat required for 1 kg. of Na_2SO_4.

3304 A Method for Determining Discharge Rates From Aerosols. *Soap and Chemical Specialties*, v. 33, Dec. 1957, p. 96-98.

3305* (Russian.) Installation for Water Deoxygenation. **Ustanovka dlia desorbtsionnogo obeskislorzhivaniia vody.** P. A. Akol'zin, V. V. Glushenko, K. I. Lazareva, and A. I. Chistiakov. *Teploenergetika*, v. 4, no. 12, Dec. 1957, p. 54-57.

Experimental data on a 100 t/hr. installation lowering the O content to 0.02-0.03 mg/liter.

3306* (German.) The Intensity Distribution of Steam Jets and Molecular Rays. **Über die Intensitätsverteilung von Dampf- und Molekularstrahlen.** K. G. Günther. *Zeitschrift für Angewandte Physik*, v. 9, no. 11, Nov. 1957, p. 550-556.

A quantitative measurement of the directional distribution in steam jets or molecular rays emerging from evaporators, as related to the discharge outlet and the steam pressure.

See also: **3236** (sepiolite as a raw materials); **3383** (process-stream analysis refractometers); **3878** (use of hydrogen from coke-oven gas in pressure hydrogenation); **3930** (chromatographic process controller); **4030** (corrosion protection in dry-ice plant); **4352** (processing water for nuclear reactors); **4417** (pressure vessel and piping codes).

CHEMISTRY—ANALYTICAL

3307 Spectrophotometric Determination of Cycloserine and Isoniazid in Pharmaceutical Preparations. J. M. Woodside, I. Piper, and J. B. Leary. *American Pharmaceutical Association, Journal (Scientific Ed.)*, v. 46, Dec. 1957, p. 729-731.

Cycloserine may be determined in certain dosage forms by dilution in hydrochloric acid and measurement of the absorbance at 219 mμ. Accuracy of the method is within ± 2%; its precision within ± 1%.

3308* Direct Spectrophotometric Determination of Chloride Ion in Water. Philip W. West and Hans Coll. *American Water Works Association, Journal*, v. 49, Nov. 1957, p. 1485-1492.

Determination by means of solution of 0.014*M* ferric perchlorate in 12*N* perchloric acid.

3309* The Determination of 17-Oxo Steroids (17-Keto Steroids) and 17-Oxogenic Steroids (17-Ketogenic Steroids). A Review. A. E. Kellie. *Analyst*, v. 82, Nov. 1957, p. 722-734.

3310* The Determination of Oxygen in Titanium and Titanium Alloys, Based on the Principle of Chlorination. W. T. Elwell and D. M. Peake. *Analyst*, v. 82, Nov. 1957, p. 734-742 + 1 plate.

Solid sample is mixed with graphite and chlorinated in an atmosphere of Ar and the products are isolated, excess of Cl being removed by reaction with Sb. The liberated CO bears a stoichiometric relationship to the amount of O present.

3311* The Determination of Tellurium in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst*, v. 82, Nov. 1957, p. 743-746.

Method based on the absorption of tellurium bromide in HBr.

3312* The Determination of Bismuth in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst*, v. 82, Nov. 1957, p. 747-750.

Spectrophotometric method using the absorption of bismuth bromide in HBr.

3313* Determination of Vitamin A by Conversion to Anhydrovitamin A. P. Budowski and A. Bondi. *Analyst*, v. 82, Nov. 1957, p. 751-760.

Vitamin A may be converted to anhydrovitamin A in benzene solution at room temperature, in the presence of toluene-*p*-sulphonic acid as a catalyst. The increase in extinction at 399 mμ, which results from the dehydration, is proportional to the amount of vitamin A present.

3314* (German.) Chelatometric Determination of Zinc, Cadmium and Lead Ions in the Presence of Variamine Blue as Redox Indicator. **Chelatometrische Bestimmung von Zink-, Cadmium- und Bleiionen in Anwesenheit von Variaminblau als Redoxindikator.** L. Erdey and L. Pólos. *Analytica Chimica Acta*, v. 17, no. 5, Nov. 1957, p. 458-462.

Using the redox system potassium ferrocyanide-potassium ferricyanide and Variamine Blue as redox indicator, the determination could be carried out at pH 5 with sufficient accuracy. In solutions containing Zn, Pb, or Cd ions, Mg can also be determined when Eriochrome Black T is used as the indicator.

3315* (French.) Chelatometric Determination of Fluorine in Organic Compounds. **Application de la chélatométrie au dosage du fluor dans les composés organiques.** Claude Hennart and Eugène Merlin. *Analytica Chimica Acta*, v. 17, no. 5, Nov. 1957, p. 463-467.

Fluorine bound in organic matter can be determined volumetrically, after decomposition with Na_2O_2, by precipitation by means of $CaCl_2$ solution, the excess of which is measured chelatometrically.

3316* (English.) **The Micro-Heterometric Determination of Silver With *p*-Dimethylamino-benzylidene-rhodanine. Direct Determination of Traces of Silver in Alloys and Solutions.** M. Bobtelsky and J. Eisenstadter. *Analytica Chimica Acta*, v. 17, no. 5, Nov. 1957, p. 503-511.

A heterometric method for the direct determination of 0.05-0.1 mg. Ag in 20 to 30 ml. solution. The solution contained, besides complexing agents, 99.7 to 99.9% of the following metals: Ca, Ba, Mg, Zn, Mn, Ni, Co, Al, Cr (99%), Fe(III), Pb, Cu, Sb, Bi, U, Hg, Zr, Ce, Th, and Tl. The error was 0.0-2.0%.

3317 Preparation and Analysis of Tracer Compounds. John R. Catch. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1726-1730.

The preparation and analysis of tracer compounds are reviewed. Special attention is given to uses in general analysis and requirements that arise from these uses, which are often different from those of biological tracer work.

3318 Facilities and Techniques for Analysis of Highly Radioactive Samples. Ralph C. Shank, James E. Rein, George A. Huff, and Fred W. Dykes. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1730-1739.

Accomplished by analyzing micro quantities in a conventional laboratory. Facilities and apparatus representative of high level installations in this country are described.

3319 Principles of Isotope Dilution Assays. Charles Rosenblum. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1740-1744.

Reverse isotope dilution procedures, commonly used in biological investigations, are a convenient means for determining the purity of a labeled compound or its stability in complex media. The stability of vitamin B_{12} in dry cereals at concentrations as low as 0.46 γ per oz. has been demonstrated by this method.

3320 The Analytical Chemistry of Plutonium. Charles F. Metz. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1748-1756.

Plutonium may be separated from impurities by precipitation, ion exchange, and solvent extraction. It may be determined by potentiometric titration, spectrophotometric, and radiochemical methods.

3321 Thiocyanate Spectrophotometric Determination of Technetium. Carl E. Crouthamel. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1756-1760.

Technetium(VII), when carefully reduced in the presence of thiocyanate in an acid medium, forms a red complex with a maximum absorbance at 513 mμ and a molar absorbance index of 52,200 ± 500 at the maximum.

3322 Precision of the Pyrohydrolytic Determination of Fluoride and Uranium in Uranyl Fluoride and Uranium Tetrafluoride. James O. Hibbits. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1760-1762.

3323 Determination of Uranium Dioxide in Stainless Steel. X-Ray Fluorescent Spectrographic Solution Technique. Louis Silverman, William W. Houk, and Lavada Moudy. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1762-1764.

Outlines a rapid method for the determination of UO_2 after chemical solution of the sample in perchloric acid.

3324 Separation of Strontium From Calcium With Potassium Rhodizonate. Application to Radiochemistry. H. V. Weiss and W. H. Shipman. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1764-1766.

The extent of recovery, which is reproducible, is a function of the C, Sr, and rhodizonate molar ratios. The two procedures given involve simple and rapid manipulations and employ easily handled chemicals.

3325 Separation and Determination of Plutonium by Liquid-Liquid Extraction. F. L. Moore and J. E. Hudgens, Jr. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1767-1770.

A rapid and quantitative radiochemical method for Pu is based on the extraction of Pu(IV) with 0.5*M* 2-thenoyltrifluoroacetone in xylene.

3326 Determination of Uranium-235 by Gamma Scintillation Spectrometry. George H. Morrison and James F. Cosgrove. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1770-1771.

Method is based on measurement of the γ photons emitted during natural radioactive decay.

3327 Gamma Absorptiometer for Solutions of Heavy Metal Salts. Donald H. Thurnau. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1772-1774.

A scintillation detector was used to measure the transmittance of the solutions for γ-rays from Am^{241}.

3328 Radioassay of Low Specific Activity Tritiated Water by Improved Liquid Scintillation Techniques. C. A. Ziegler, D. J. Chleck, and J. Brinkerhoff. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1774-1776.

The performance of liquid scintillators is improved by making the water sample-scintillating solution ratio optimum, and deoxygenating the scintillating solution by an ultrasonic irradiation technique.

3329 Spectrophotometric Determination of Iron in Clay and Limestone. Peter F. Lott and K. L. Cheng. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1777-1778.

A simple procedure using the disodium salt of (ethylenedinitrilo)tetraacetic acid to prevent interference of cations.

3330 Spectrochemical Determination of Lead in Steel. L. C. Flickinger, E. W. Polley, and Frank A. Galletta. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1778-1779.

Lead in steel in concentrations from 0.05 to 0.50% can be determined rapidly.

3331 Spectrochemical Determination of Trace Impurities in Commercial Grade Ammonium Chloride. K. W. Beyer and O. T. Aepli. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1779-1780.

Ammonium chloride is removed by sublimation.

3332 X-Ray Diffraction Powder Data of Some Normal Alkyl Dithiol Esters of Sebacic Acid. D. A. Lutz, L. P. Witnauer, Richard Sasin, and George S. Sasin. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1780-1782.

All the individual compounds can be easily distinguished and identified by the diffraction data.

3333 Mass Spectrometric Analysis. Aliphatic Ethers. Fred W. McLafferty. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1782-1789.

Correlation of the spectra of 25 saturated aliphatic ethers shows the unique usefulness of the mass spectrometer in identification, structure determination, and analysis of such compounds.

3334 Determination of Unsaturation by Near-Infrared Spectrophotometry. Robert F. Goddu. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1790-1794.

Evaluation of the near-infra-red region of the spectrum (1 to 3 μ) for the determination of unsaturation in organic compounds.

3335 Ultraviolet Spectrophotometric Determination of Nitrate. Application to Analysis or Alkaline Earth Carbonates. Robert Bastian, Richard Weberling, and Frank Palilla. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1795-1797.

This rapid and accurate method utilizes ultra-violet absorption of nitrate ion in dilute perchloric acid solution.

3336 Determination of Carbon-14 Steroids on Paper Chromatograms. David L. Berliner, Oscar V. Dominguez, and Garth Westenskow. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1797-1800.

Steroids may be quantitated directly on paper chromatograms by using β-ray self-absorption factors and measuring radioactive areas recorded on a strip counter.

3337 Characterization and Purification of Subtilin by Paper Electrophoresis. Lawrence E. Sacks and James W. Pence. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1802-1805.

This characterization is rapid and avoids interference by the strong adsorption of subtilin components on paper. Separation of several components was demonstrated by a chlorine, starch-iodine stain.

3338 Accuracy of Quantitative Paper Chromatography in Amino Acid Determination Using Direct Photometry. Henry R. Roberts and Michael G. Kolor. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1800-1802.

A study of the accuracy and precision of the quantitative paper chromatographic procedure developed by McFarren and Mills for determination of amino acids in protein hydrolyzates.

3339 Separation of Platinum, Palladium, Rhodium, and Iridium by Paper Electrochromatography. William M. MacNevin and Myron L. Dunton. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1806-1809.

The following combinations have been quantitatively separated on a continuous basis: Pt(IV) and Pd(II), Pd(II) and Ir(IV), Rh(III) and Ir(IV), Rh(III) and Pt(IV), and Rh(III), Pd(II), and Ir(IV).

3340 Radial Paper Chromatography. Application to Analysis of Mixtures of Chlorophyll Derivatives. Merrill J. Hendrickson, Robert R. Berueffy, and A. Ross McIntyre. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1810-1815.

Based on well known principles of design, a simple chromatographic apparatus of the radial type has been constructed for the precise characterization and determination of organic pigments soluble in nonpolar solvents.

3341 Quantitative Determination of Serum Proteins by Paper Electrophoresis. Rapid Dyeing Method. Katherine M. Formusa, Ruth R. Benerito, W. S. Singleton, and J. L. White. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1816-1820.

The techniques used to standardize a rapid and quantitative method for the dyeing of serum proteins are described in detail.

3342 Classification of Organic Compounds. Based on Behavior of a Solvochromic and Thermochromic Indicator System. Saul Soloway and Perry Rosen. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1820-1823.

Organic compounds are classified according to their effectiveness in promoting or inhibiting chelation between ferric chloride and *n*-propyl gallate.

3343 Present Status of Cerium(IV)-Cerium(III) Potentials. Earl Wadsworth, Frederick R. Duke, and C. A. Goetz. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1824-1825.

The variation of potential of the Ce(IV)-Ce(III) couple with the type of anion present is reviewed.

3344 Anodic Stripping Voltammetry Using the Hanging Mercury Drop Electrode. Richard D. DeMars and Irving Shain. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1825-1827.

The anodic stripping is performed using the techniques of voltammetry with continuously varying potential, and the anodic peak current is a function of the concentration of the ion in the solution and the cathodic plating time.

3345 Generalized X-Ray Emission Spectrographic Calibration Applicable to Varying Compositions and Sample Forms. H. D. Burnham, John Hower, and L. C. Jones. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1827-1834.

A general scheme of analysis based on the equations of Sherman has been attempted and applied to the determination of Cr, Fe, and Ni in steels.

3346 Determination of Aromatic Hydrocarbons in Polluted Air. Jerome F. Thomas, Bernard D. Tebbens, Mitsugi Mukai, and Eldon N. Sanborn. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1835-1840.

Techniques for the separation of the fluorescent organic material found in polluted aerosol samples.

3347 Measurement of Concentrations of Gaseous Halide Tracers in Air by Positive Ion Emission Techniques. Harvey A. Schultz. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1840-1842.

Dichlorodifluoromethane, Freon 12, is a promising tracer for atmospheric diffusion studies. Current studies on the mechanism of operation are briefly outlined.

3348 Determination of Xanthate Sulfur in Viscose. J. P. Dux and L. H. Phifer. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1842-1845.

The proposed rapid and precise method for determining the concentration of cellulose xanthate in viscose is described.

3349 Determination of Mononitrothiophene and Dinitrothiophene in Nitrobenzene. Wladimir Leibmann and J. T. Woods. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1845-1846.

3350 Carbon-Hydrogen Analysis of Coke on Catalysts. S. G. Hindin, J. K. Lee, and S. W. Weller. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1850-1852.

A method is proposed using synthetic cracking catalysts or Pt-containing reforming catalysts.

3351 Determination of Carbon, Hydrogen, and Nitrogen in Organoboron Compounds. Paul Arthur, Raymond Annino, and W. Patrick Donahoo. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1852-1854.

By employing quartz combustion tubes and heating to high temperatures (1000 to 1100 C) in the unpacked section around the combustion boat, both C and H could be determined with excellent accuracy and precision. Nitrogen was determined in acetanilide-boron trifluoride.

3352 Determination of Carbon Dioxide in Gas Streams. Paul E. Toren and B. J. Heinrich. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1854-1856.

A method for determining concentrations ranging from 1 p.p.m. to 100% in a gas stream.

3353 Derivative Thermometric Titrations. S. T. Zenchelsky and P. R. Segatto. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1856-1858.

An apparatus for obtaining first and second derivative curves is described. Recorder plots of the derivative curves are presented, with the results of several titrations used to ascertain the accuracy and reproducibility of the method.

3354 Distribution of *n*-Paraffins and Separation of Saturated Hydrocarbons From Recent Marine Sediments. E. D. Evans, G. S. Kenny, W. G. Meinschein, and E. E. Bray. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1858-1861.

Mass spectrometric analyses of the chromatographic fractions established the efficiency of the separation of naphthenic and paraffinic hydrocarbons on alumina columns at different adsorbent-sample ratios, and showed that *n*-paraffin mixtures are separated on a mol. wt. basis on alumina at certain adsorbent to sample ratios.

3355 Detection of Oiticica Oil in Coatings. G. G. Esposito and M. H. Swann. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1861-1862.

Oiticica oil can be detected in coating materials by the red color developed with *m*-dinitrobenzene.

3356 Structural Analysis of Clinical Dextrans by Periodate Oxidation and Isotope Dilution Techniques. J. D. Moyer and H. S. Isbell. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1862-1866.

A new method for determination of the 1,3'- and 1,4'-linkages of dextran is based on quantitative determination of the fragments formed by periodate oxidation of the polysaccharide and hydrolysis of the resulting polymeric dialdehyde.

3357 Analysis of Aromatic Sulfonation Reaction Mixtures. Wm. H. Houff, D. R. Christie, and R. H. Beaumont. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1866-1868.

Mixtures containing sulfuric acid and sodium sulfate were analyzed by a three-step procedure.

3358 Determination of Oxygen in Niobium. W. R. Hansen and M. W. Mallett. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1868-1869.

Oxygen in Nb is determined by a diffusion-extraction method using conventional vacuum-fusion equipment. The mean deviation of analyses at the 0.019 wt.% O level is less than 0.001 wt.%. The sensitivity of the analysis could be increased by increasing the sample size.

3359 Determining Serum Protein-Bound Iodine. Richard D. Strickland and Clara M. Maloney. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1870-1873.

An improved method requires only 0.5 ml. of serum, can be carried out in less than 3 hrs., and has an error of less than 10%.

3360 Infrared Microtechniques for Identification of Carbohydrates and Other Organic Compounds. Frank E. Resnik, et al. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1874-1877.

A study of carbohydrates in tobacco illustrates the utility of the method, which may be applied to both water-soluble and water-insoluble materials such as may be encountered in natural products and other biologically important systems.

3361 Desalting Amino Acid Solutions by Displacement With Piperidine. Donald L. Buchanan. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1877-1878.

A mixture of 18 amino acids and the chloride salts of Na, K, Ca, and Mg were placed on a column of Dowex 50 resin and displaced with piperidine.

3362 Potentiometric Recorder for Hydrogen Sulfide and Hydrogen Cyanide. John P. Strange. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1878-1881.

An instrument has been developed that can be adjusted to give full-scale deflection for concentrations of H_2S or HCN ranging from 4 p.p.b. to 50 p.p.m. or higher.

3363 Determination of Ammonia With Cupric Carbonate. R. C. Blinn and F. A. Gunther. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1882-1883.

Two methods for the determination of NH_3 based upon the solubility of ammonium salts in alkaline solution are presented.

3364 Determination of Small Amounts of Iodide in the Presence of Chloride by Potentiometric Titration. R. H. Stokes and L. A. Woolf. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1883-1885.

3365 Flame Spectrophotometric Determination of Microgram Quantities of Magnesium. Louis Manna, D. H. Strunk, and S. L. Adams. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1885-1887.

A rapid procedure is described which is precise and requires no preliminary separations.

3366 Microdetermination of Fluorine. Joseph Samachson, Norman Slovik, and Albert E. Sobel. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1888-1891.

The apparatus described permits the distillation of microgram quantities of fluoride in a small volume of distillate with low blanks.

3367 The Analytical Uses of Ethylenediaminetetraacetic Acid. Frank J. Welcher. 366 p. 1958. D. Van Nostrand Co., Princeton. (QD77 W44a)

Details of the significant work, in analysis and control, that has appeared up to this time including types of procedures and variations, reports on interference, optimum conditions, and claims of accuracy.

3368* (German.) Ethylenediamine Tetraacetic Acid as a "Masking" Agent in Analytical Chemistry. **Äthylendiamintetraessigsäure als Maskierungsmittel in der analytischen Chemie.** H. Flaschka. *Angewandte Chemie*, v. 69, no. 22, Nov. 21, 1957, p. 707-712.

Use where precipitation, qualitative detection of trace elements, photometric analysis, and titration are involved.

3369* Ascending Paper Chromatography. A Way To Do It. Lloyd C. Mitchell. *Association of Official Agricultural Chemists, Journal*, v. 40, Nov. 1957, p. 999-1029.

3370* The Determination of Polyoxyethylene Esters in Bread and Rolls. R. A. Garrison, V. Harwood, and Ross A. Chapman. *Association of Official Agricultural Chemists, Journal*, v. 40, Nov. 1957, p. 1085-1093.

The emulsifying agents used in bread and rolls may be extracted with a constant recovery and analyzed by a colorimetric method.

3371* (German.) The Spectrographic Determination of Trace Elements in Steel With Moving Electrodes. **Spektrographische Bestimmung der Spurenelemente in Stahl mit bewegten Elektroden.** Siegfried Eckhard and Walter Koch. *Archiv für das Eisenhüttenwesen*, v. 28, no. 11, Nov. 1957, p. 731-738.

By using a 1.5 m-lattice-spectrograph with a 4400 v. a.c. arc, and by moving the electrodes, the proof limit for Al and Mn in pure Fe could be reduced from 0.0004 to 0.0001% Al, and from 0.009 to 0.003% Mn.

3372 The Distribution of Bismuth Nitrate From Aqueous Solutions to Ethers and Methyl Isobutyl Ketone (Hexone). Arno H. A. Heyn and Gurupada Banerjee. *Boston University (U. S. Atomic Energy Commission)*, NYO-7576, July 1957, 27 p. (UF767 U3ny Contin.)

Studies to determine trace amounts of U in a large excess of Bi. Among the solvents studied, ethers are better extractants for U in presence of Bi under comparable conditions than methyl isobutyl ketone.

3373 The Chromatographic Determination of Glutamic, Aspartic, and Cysteic Acids Using an Anion Exchange Resin. A. M. Marko. *Canadian Journal of Biochemistry and Physiology*, v. 35, Dec. 1957, p. 1249-1258.

3374* (English.) **Oxidimetric and Reductometric Titrations in Neutral Solutions. (Application of Sodium Triphosphate as Masking Agent to Volumetric Analysis).** Susumu Suzuki, Kenji Harimaya, Morio Ueno, Nobuo Tsuji, and Noriko Yamaoka. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 766-770.

3375* (English.) **Determination of Nitro Compounds With Titanium(III) Polyphosphate Solution. (Application of Polyphosphate to Masking Volumetric Analysis).** Susumu Suzuki, Yoshihiro Muramoto, Morio Ueno, and Teruzo Sugano. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 775-778.

Determination of mono-, di-, and tri-nitro compounds by reduction with an excess of standard titanium(III) polyphosphate solution and back-titration with $K_2Cr_2O_7$, $Ce(CO_4)_2$, or sodium vanadate solution.

3376* (English.) **Studies on Organic Reagents for Inorganic Analysis. II. Spectrophotometric Study on Phenylfluorone Chelates of the Fourth Group Metal Elements.** Hirotoshi Sano. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 790-794.

The relation between the nature of the chelating bond and the color change of reagent was examined, using 2,3,7-trihydroxy-9-phenyl-fluorone as reagent.

3377 Submicro-Methods for the Analysis of Organic Compounds. II. The Determination of Alkoxyl Groups. R. Belcher, M. K. Bhatty, and T. S. West. *Chemical Society, Journal*, 1957, Nov., p. 4480-4482.

3378* (Italian.) Argentometric Determination of Tetraethyllead, Ethylene Chloride, and Ethylene Bromide in Antiknock Compounds. **Determinazione argentometrica del piombotetraetile, cloruro e bromuro d'etilene nelle miscele antidetonanti.** Giuseppe Tagliavini. *Chimica e l'Industria*, v. 39, no. 11, Nov. 1957, p. 902-904.

3379* (French.) Precision and Rapidity of Certain Chemical and Physical Determination of Alumina in Aluminosilicates. **Sur la précision et la rapidité de certains dosages chimiques et physiques de l'alumine dans les silico-alumineux.** I. A. Voinovitch and J. Debras. *Chimie Analytique*, v. 39, no. 11, Nov. 1957, p. 418-428.

Difficulties encountered in the physiochemical, chemical, and physical determination of Al_2O_3 in aluminosilicates. Dispersion of results and lack of reproducibility when the same substances are analyzed by different methods.

3380* (French.) Determination of the Thionyl Group in Organic Compounds. **Dosage du groupement thionyle dans les composés organiques.** Claude Hennart and Eugène Merlin. *Chimie Analytique*, v. 39, no. 11, Nov. 1957, p. 429-431.

The thionyl group was easily determined by using phosphoric acid to decompose the alkaline sulfite obtained by saponification, and by collecting the sulfurons gas formed in standard I solution.

3381* (German.) Identification of Organic Substances. **Identifizierung organischer Verbindungen. XV.** Identification of Benzidine and Its Isomers. **Identifizierung von Benzidin und seinen Isomeren.** M. Večeřa. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1584-1595.

Production of derivatives of aromatic diamines 1-V and method of their microidentification. Possible utilization of these methods for identification of substituted benzidines and isomers.

3382* (French.) Intensity of Spectral Rays. **Sur l'intensité des raies spectrales.** Henri Triché. *Comptes Rendus*, v. 245, no. 20, Nov. 13, 1957, p. 1718-1721.

Effect of the physico-chemical state of an alloy on the ratio of intensity of two lines belonging to two different elements or to one element only; effect of the power of a source on the spectral character of the emission; effect of a third element.

3383 Refractometers in Process-Stream Analysis. Leo G. Glasser. *Control Engineering*, v. 4, Dec. 1957, p. 96-101.

Basic principles of differential and critical-angle refractometers; two monitoring and control applications in chemicals and petroleum.

3384 Polarographic Determination of Uranium in the Presence of Molybdenum. Robert C. Propst. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-236, Sept. 1957, 22 p. (UF767 Un3.1dp Contin.)

Method is applicable to the analysis of radioactive solutions that contain a high concentration of Al. Precision is 2.5% and time required for duplicate analyses is one hr.

3385 Vapor-Phase Chromatography. A. P. Gifford. *Instruments and Automation*, v. 30, Dec. 1957, p. 2264-2265.

Chromatographic methods; advantages and limitations; process monitoring.

3386 An Investigation of a Method for the Combined Determination of Niobium and Tantalum in Steel. *Iron and Steel Institute, Journal*, v. 187, Dec. 1957, p. 341-343.

3387* Past, Present and Future of Gas Chromatography. A. J. P. Martin. *ISA Journal*, v. 4, Dec. 1957, p. 563-566.

3388 The Determination of Lead in Polyvinyl Chloride Compositions Containing Lead Stabilizers. S. Grossman and J. Haslam. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 639-644.

The polymer is dissolved in ethylene dichloride and the Pb extracted with strong HCl. This HCl solution is separated and diluted to 50% v/v strength with water prior to determination of Pb by measurement of the u.v. absorption of the $PbCl_2$ complex at 270 mμ.

3389 Magnetic Analysis of Alloys by Electron Diffraction. S. Yamaguchi. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1310-1311.

Electron diffraction patterns obtained from ferromagnetic substances of (Cu-Ni and stainless steel) are influenced by the magnetic fields of the substances. The results obtained are of of use for magnetochemical analysis of ferromagnetic alloys.

3390* Radiochemical Analysis of Silicon. J. A. James and D. H. Richards. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 500-506.

Results of radioactivation analyses for some 12 elements are given for Si from two sources. The results of segregation coefficient measurements using radiochemical methods are quoted for P, Fe, Co, W, and Au.

3391* Photometric Determination of Tungsten in Steel and Titanium Alloys With Dithiol. Lawrence A. Machlan and John L. Hague. *Journal of Research, National Bureau of Standards*, v. 59, Dec. 1957, p. 415-420.

3392 (Serbian.) Separation of Bismuth From Other Metals by Rapid Electrolysis of Sulfate Solution. **Odvajan'e bizmuta od drugikh metala brzom elektrolizom rastvora sulfata. III.** M. S. Jovanovich and S. Dz. Jankovich. *Khemisko Drushtvo Beograd, Glasnik*, v. 22, no. 3, 1957, p. 167-174.

Method of separating Bi from Cd and Zn at 70 C at 2.0 v.

3393 (Hungarian.) Determination of Ag^+, Pd^{2+}, and Cu^+ by Radiometric Titration With ^{131}I as Indicator. **Az Ag^+, Pd^{2+}, Cu^+ radiometriás titrálással való meghatározása ^{131}J indikátor felhasználásával.** György Tölgyessy and Pál Schiller. *Magyar Kémiai Folyóirat*, v. 63, no. 10, Oct. 1957, p. 269-271.

Description of equipment for ions giving a precipitate with I^-. The equivalence point is given graphically or mathematically and in 8 to 10 min. in the later case.

3394 (Hungarian.) Iodometric Investigations. **Jodometriás vizsgálatok. III.** Reciprocal Determination of Iodate and Periodate Ions. **Jodát és perjodát-ionok meghatározása egymás mellett.** László Szekeres. *Magyar Kémiai Folyóirat*, v. 63, no. 10, Oct. 1957, p. 272-275.

The periodate ions were reduced in a $NaHCO_3$ solution with H_3O_3 to iodate the ions. This reaction was used to determine iodate and periodate ions reciprocally.

3395* Voltammetry and Amperometric Titration at the Rotated Platinum Electrode of Manganese(II), (III), and (VII) in Pyrophosphate Medium. I. M. Kolthoff and Einar Jacobsen. *Microchemical Journal*, v. 1, no. 1, 1957, p. 3-16.

3396* Organic Chemical Microscopy. I. Amine Picrates in Qualitative Organic Analyses. Ralph E. Dunbar and John Knuteson. *Microchemical Journal*, v. 1, no. 1, 1957, p. 17-37.

Application of microscopy to the identification of amines by means of their picrate derivatives.

3397* Gravimetric Microdetermination of Carbonyl Groups by Hydrazone Formation. T. S. Ma, John Logun, and Peter P. Mazzella. *Microchemical Journal*, v. 1, no. 1, 1957, p. 67-73.

Procedure is based on the condensation of the carbonyl compound with 2,4-dinitrophenylhydrazine, forming an insoluble hydrazone.

3398* A Rapid Micro-Dumas Method for Nitrogen Determination. Grant M. Gustin. *Microchemical Journal*, v. 1, no. 1, 1957, p. 75-87.

Techniques and equipment employed remove all causes of a gas blank and hence, gas blanks themselves, with the exception of the constant adsorbed air blank from Cu oxide.

3399* Applications of Redox Reactions of *p*-Nitroso Aromatic Amines in Spot Test Analysis. Fritz Feigl and David Goldstein. *Microchemical Journal*, v. 1, no. 2, 1957, p. 177-181.

p-Nitrosodimethylaniline is reduced by ascorbic acid, gallic acid, tannin, mercapto- and thiol compounds to *p*-aminodimethylaniline. If the reaction is conducted in the presence of *p*-dimethylaminobenzaldehyde, the red Schiff base of the corresponding primary amine is formed. This behavior makes possible a selective preliminary test for the presence of reducing compounds, and also serves as the basis of a reaction to detect *p*-nitroso aromatic amines.

3400* Ultramicro Chelometric Titrations With Potentiometric End Point Detection. Fawzy S. Sadek and Charles N. Reilley. *Microchemical Journal*, v. 1, no. 2, 1957, p. 183-201.

3401* The Microdetermination of Carbon and Hydrogen in Compounds Containing Alkali and Alkaline Earth Metals. Erik Kissa. *Microchemical Journal*, v. 1, no. 2, 1957, p. 203-207.

Analysis by combustion of sample which has been covered with WO_3.

3402* (Russian.) Fractional Reaction for Detection of Copper. **Drobnaia reaktsiia obnaruzheniia medi.** A. S. Kozlov. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 223-226.

Reaction is based on the fractional deposition of $Cu_2Fe(CN)_6$ on Cd salt.

3403* The Separation of Fatty Esters and Aldehydes by Gas Liquid Chromatography. J. C. Hawke, W. L. Dunkley, and C. N. Hooker. *New Zealand Journal of Science and Technology*, v. 38, sec. B, no. 9, Nov. 1957, p. 925-938.

Construction of a relatively simple chromatographic apparatus and thermal conductivity detector. Quantitative estimations of normal and branched-chain fatty acid esters up to C_{20}. Separation of mixtures of lower aldehydes.

3404 Qualitative Testing and Inorganic Chemistry. Joseph Nordmann. 488 p. 1957. John Wiley & Sons, New York. (QD81 N75q)

A modernized approach to qualitative analysis, including extensive practical applications to industrial chemistry.

3405 Sonic Gas Analyzer for Measurement of CO_2 in Expired Air. E. D. Stott. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 941-915.

Instrument intended primarily for estimation of CO_2 in the physiological range of 0-10% uses a resonant cavity maintained in oscillation by a transistor amplifier as the measuring device. Change in frequency caused by the presence of CO_2 in the cavity is linearly related to the amount of CO_2 present.

3406* (French.) The Measurement of the Effective Line-Width of Rays in the Analysis of Powders. **La mésure de la "largeur effective" des raies dans l'analyse des substances en poudre.** A. Fiorenza and M. Lachin. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 85-98.

After discussing the difficulty of applying spectrochemical analysis to powders, the method of measurement used and special photometer required are described. For each element it has been found advisable to measure a group of lines, instead of a single one; the improvement gained is described.

3407 A Rapid Determination of Micro Quantities of Mercury in Urine and Water Using the Mercurometer. W. T. McBryde and Fred Williams. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1178, Sept. 1957, 12 p. (UF767 Un3.1y Contin.)

The mercurometer is a combination of instruments which measures the flow of Hg vapors volatilized from a CdS asbestos pad.

3408 Oak Ridge National Laboratory Master Analytical Manual. *U. S. Atomic Energy Commission*, TID-7015 (sec. 2), Nov. 1957, not paged. (UF767 Un3ti Contin.)

A compilation of analytical methods including stepwise procedures and fundamental principles.

3409 Turbidimetric Determination of Naphthalene in Gas. L. J. Kane, et. al. *U. S. Bureau of Mines, Report of Investigations* 5368, Oct. 1957, 12 p. (TN21 Un3r Vis.)

The gas is passed through a saturated aqueous solution of picric acid at 3 to 4 C, whose turbidity is then measured at room temperature.

3410 The Determination of Lithium Hydride in Commercial-Grade Lithium Hydride. Jack W. Frazer, Carl W. Schoenfelder, and Robert L. Tromp. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4944, July 1957, 9 p. (UF767 U3u Contin.)

Determination of H in LiH by reacting the sample with boiling Hg and measuring the evolved H. Amount of LiOH present is determined by measuring the H evolved from the reaction $LiOH + LiH \rightarrow Li_2O + H_2$. Lithium hydride assays are obtained from the difference of these two determinations.

3411* (German.) Chelatometry. **Chelatometrie. XVI.** The Complexometric Simultaneous Determination of Iron(III) and Aluminum Ions. **Die komplexometrische Nebeneinanderbestimmung von Eisen(III)- und Aluminiumionen.** Peter Wehber. *Zeitschrift für Analytische Chemie*, v. 158, no. 5, 1957, p. 321-339.

Determination by three titration methods and use of EDTA as solvent.

3412* (English.) **Titration of Amidopyrine in Non Aqueous Solvents.** B. Láng and L. Tavaszy. *Zeitschrift für Analytische Chemie*, v. 158, no. 5, 1957, p. 339-347.

Reviews methods for the assay of amidopyrine. A detailed description is suggested for assay by titration.

3413* (English.) **Use of Organic Reagents in Inorganic Analysis. V. Paper Chromatography of Some Metal Complexes of 1-Nitroso-2-hydroxy-3-naphthoic Acid.** Sachindra Kumar Datta and Prafullanath Ghose. *Zeitschrift für Analytische Chemie*, v. 158, no. 5, 1957, p. 347-355.

Paper chromatography of Co, Pd, U, Th, and Zr 1-nitroso-2-hydroxy-3-naphtholates which are quantitatively precipitated.

3414* (German.) Photometric Determination of Cobalt as Tributylammoniumhexarhodanocobalt(II). **Zur photometrischen Bestimmung von Kobalt als Tributylammoniumhexarhodanokobaltat(II).** M. Ziegler, O. Glemser, and E. Preisler. *Zeitschrift für Analytische Chemie*, v. 158, no. 5, 1957, p. 358-360.

Determination of Co in steels and Ni-Cr, Zn, and other alloys.

3415* (German.) The Determination of Small Amounts of Molybdenum in Tungstates. **Über die Bestimmung kleiner Mengen von Molybdän in Wolframaten.** Christoph Winterstein. *Zeitschrift für Erzbergbau und Metallhuttenwesen*, v. 10, no. 11, Nov. 1957, p. 549-551.

The calorimetric or, still better, the photometric method is suggested.

See also: **3136** (determination of fungicide in food crops and animal tissues); **3150** (chromatography of Rauwolfia); **3153** (bioassay principles); **3185** (estimation of urea in blood); **3909** (microdetermination of U); **3930** (chromatographic process controllers); **4062** (determination of hydrogen in Fe); **4252** (identification of inclusions in steel); **4587** (tracer techniques in fiber research).

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3416* (English.) **The Stability of Metal Halide Complexes in Aqueous Solution. III. The Chloride, Bromide and Iodide Complexes of Bismuth.** Sten Ahrland and Ingmar Grenthe. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1111-1130.

3417* (English.) **Studies on the Extraction of Metal Complexes. XXVIII. The Distribution of Some Actinides and Fission Products Between Tributyl Phosphate (TBP) and Aqueous Solutions of HNO_3 and $Ca(NO_3)_2$.** Brita Bernström and Jan Rydberg. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1173-1182.

3418* (German.) Effect of the Quantity of Bromides in Bromatometric Processes. **Beeinflussung der Bromatometrie Durch die Menge der Bromide.** É Zöllner and E. Varga. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 12, no. 1, 1957, p. 1-13.

The quantity of bromide affects the course of the reaction mostly with compounds containing an oxidizable S atom. In general, a greater amount of bromide reduces the values.

3419* (French.) A Contribution to the Study of Nitrides, Acetylides and Silicides. Evidence for the Existence of the N^{3-} Ion. Research on the Existence of a Carbon Ion. **Contribution a l'étude des nitrures, des acétylures et des siliciures. Mise en évidence de l'ion N^{3-}. Recherches sur l'existence d'un ion carbone.** E. Masdupuy. *Annales de Chimie (Paris)*, v. 2, nos. 7-8, July-Aug. 1957, p. 527-586.

Proof for the existence of the N^{3-} ion. Preparation and properties of lithium nitride. Electroconductivity and electrolysis. Electroconductivity of acetylene dissolved in water, acetone, and in liquid ammonia. Constitution and decomposition of ammoniacal calcium acetylide. Analysis of lithium silicides. Effects of water and of hydrochloric acid.

3420* (French.) Progressive Dehydration of $Na_2SO_4, {}_7H_2O$ in Aqueous Solution. **Déshydratation ménagée de l'hydrate $SO_4Na_2, {}_7H_2O$ en solution aqueuse.** Pierre Silber. *Comptes Rendus*, v. 245, no. 21, Nov. 18, 1957, p. 1806-1809.

Study of the metastable equilibria in the ternary system H_2O-NaCl-Na_2SO_4 made it possible to characterize the existence of a new secondary hydrate of sodium sulphate, $Na_2SO_4 \cdot 6H_2O$.

3421* (French.) Preparation of Pure Anhydrous Zirconium Fluoride. **Préparation du fluorure de zirconium anhydre pur.** C. Decroly, D. Tytgat, and J. Gérard. *Énergie Nucléaire*, v. 1, no. 3, July-Sept. 1957, p. 155-160.

A study of the preparation of pure anhydrous ZrF_4 (with Hf), on a laboratory scale. Zirconium oxide was the basic material. Acid ammonium fluoride was used. Purification of ZrF_4 at 700 C in vacuum.

3422* (Japanese.) **Research on Copper Azide Detonator. I. On the Manufacture of Copper Azide and the Impact Sensitivity Test. II. On the Decomposition Qualities of Copper Azide.** Shohachiro Ohkubo, Kazuo Shino, and Senzo Oinuma. *Government Chemical Industrial Research Institute, Tokyo, Reports*, v. 52, no. 9, Sept. 1957, p. 311-320.

3423 Gamma Radiolysis of Tributyl Phosphate and Tributyl Phosphate-Diluent Systems. L. L. Burger and E. D. McClanahan, Jr. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-52943, Sept. 1957, 21 p. (UF767 Un3.1hw Contin.)

The liquid products include dibutyl phosphate, butyl alcohol, monobutyl phosphate, butyl ether, phosphoric acid, hydrocarbons, and polymers.

3424* (Russian.) Optical Investigation of Polymorphous Modifications of MnS. **Opticheskoe issledovanie polimorfnykh modifikatsii sernistogo margantsa.** S. S. Batsanov and V. V. Kopytina. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 227-236.

Chemical and X-ray analysis of the following three modifications of MnS: α (green), β, and γ (pink).

3425 New Chemistry. 206 p. 1957. Simon and Schuster, New York. (QD37 Sci27n)

A collection of articles, written in nontechnical language, reporting on the most significant postwar advances in chemistry. Emphasis is on basic chemical researches and industrial applications.

3426* (Polish.) Preparation of Sodium Polymetaphosphates and Polyphosphates. **Otrzymywanie polimetafosforanów i polifosforanów sodowych.** M. Dankiewicz. *Przemysł Chemiczny*, v. 13, no. 10, Oct. 1957, p. 599-602.

Preparation; capacity for softening water; effect of admixtures on hygroscopicity; molecular structure.

3427* **Studies in the Radiolysis of Ferrous Sulfate Solutions. I. Effect of Oxygen Concentration in 0.8 N Sulfuric Acid.** A. O. Allen and Walter G. Rothschild. **II. Effect of Acid Concentration in Solutions Containing Oxygen.** A. O. Allen, Virginia D. Hogan, and Walter G. Rothschild. *Radiation Research*, v. 7, Dec. 1957, p. 591-608.

3428 The Isolation of Americium-241 in 100-Milligram Quantities From Large Amounts of Impurities. Fritz Weigel. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3934, Sept. 1957, 32 p. (UF767 U3u Contin.)

Preparation of pure Am samples. Processing is most strongly influenced by the presence of lanthanides, especially La itself, which are difficult to separate from the Am. Separation procedures used on five different starting materials are described.

3429* (German.) Investigation of the Structure of Graphite Oxides. **Untersuchungen zur Struktur des Graphitoxyds.** Alexander Clauss, Reinhold Plass, H.-P. Boehm, and Ulrich Hofmann. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 205-220.

Preparation of white and dark graphite oxides and study of their structure.

3430* (German.) Oxidation of Thallium(I) Sulfides. **Über die Oxydation des Thallium(1)-sulfids. VI.** Chemistry and Kinetics of High Temperature Oxidation. **Chemismus und Kinetik der Oxydation bei höheren Temperaturen. VII.** Chemistry and Constitution of Tl_2SO_2. **Zur Chemie und Konstitution des Tl_2SO_2.** Bertold Reuter and Hans Wolfgang Levi. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 239-268.

Oxidation of Tl_2S by acid at 250 C, under 100 to 200 mm. pressure.

3431* (German.) Chemical Investigation of Silicates. **Chemische Untersuchungen von Silicaten. XIX.** The Products of the Action of Water on β-Ca_2SiO_4 at Temperatures up to 120 C. **Die Produkte der Wassereinwirkung auf β-Ca_2SiO_4 bis 120°.**

Herbert Funk. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 276-293.

Discussion of conditions under which each of the following compounds occur: γ-C_2S, β-C_2S, $Ca(OH_2)$, and aqueous calcium silicate.

3432* (German.) Aromatic Metal Complexes. **Über Aromatenkomplexe von Metallen. XI.** Complexes of Ruthenium(II) With Mesitylene. **Ein Komplex des Ruthenium(II) mit Mesitylen.** E. O. Fischer and R. Böttcher. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 305-309.

3433* (German.) New Compounds With Apatite-Like Structure. **Neue Verbindungen mit apatitartiger Struktur. II.** Group of the Alkali Lead Compounds. **Die Gruppe der Alkali-Blei-Verbindungen.** L. Merker and H. Wondratschek. *Zeitschrift für Kristallographie*, v. 109, no. 2, Oct. 1957, p. 110-114.

Compounds of the composition $Pb_4A(YO_4)_3$ [A=Na, K, Rb, Cs, Tl; Y=P, As, V] were found to have an apatite-like structure.

3434* (Russian.) Iodides of Tantalum. **Ob iodidakh tantala.** D. M. Chizhikov and B. N. Rabinovich. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 11, Nov. 1957, p. 2513-2516.

Preparation of Ta iodide (by heating powdered Ta in I vapor at 550 C) and X-ray analysis of its structure.

3435* (Russian.) Interaction of Boron Trichloride With Hydrogen in the Presence of Aluminum and Certain Alloys. **Issledovanie vzaimodeistviia trekhkhloristogo bora s vodorodom v prisutstvii aliuminiia i nekotorykh ego splavov.** V. I. Mikheeva and T. N. Dymova. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 11, Nov. 1957, p. 2530-2538.

Attempt was made to increase the yield of diborane in the reaction of BCl_3 with H in the presence of Al alloyed with other metals.

3436* (Russian.) Phase Composition, Structure, and Homogeneity Limits of Phases in the System Vanadium-Carbon-Oxygen. **Issledovanie fazovogo sostava, stroeniia i granits gomogennosti faz sistemy vanadii-uglerod-kislorod. II.** Investigation of the System Vanadium-Oxygen (Lower Oxides of Vanadium). **K issledovaniiu sistemy vanadii-kislorod (nizshie okisly vanadiia).** M. A. Gurevich and B. F. Ormont. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 11, Nov. 1957, p. 2581-2588 + 1 plate.

3437* (Russian.) The Study of the Thermochemical Disintegration of Aluminum Sulfate. **Issledovanie termokhimicheskogo razlozheniia sul'fata aliuminiia.** V. V. Pechkovskii and A. N. Ketov. *Zhurnal Prikladnoi Khimii*, v. 30, no. 10, Oct. 1957, p. 1506-1510.

Rate of disintegration and its relation to temperature, duration of the experiment, amount of O in the original gas, and presence of admixtures in the charge was studied.

3438* (Russian.) Regeneration of Arsenic-Sodium Carbonate Solutions. **Regeneratsiia mysh'iakovo sodovykh rastvorov.** N. I. Brodskaia, M. I. Gerber, and V. P. Teodorovich. *Zhurnal Prikladnoi Khimii*, v. 30, no. 10, Oct. 1957, p. 1510-1515.

The oxidation process of the solutions, and the effect of sodium carbonate and hydrosulfite content on the oxidation rate of thioarsenic compounds were studied.

3439* (Russian.) Solid-Phase Hydrolysis of Manganous Chloride. **Gidroliz khloristogo margantsa v tverdoi faze.** G. I. Zvorykina. *Zhurnal Prikladnoi Khimii*, v. 30, no. 10, Oct. 1957, p. 1515-1525.

The effect of various factors on the rate of hydrolysis.

See also: **3261** (properties of UO_2).

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3440* (English.) **O-Phosphorylserine.** Georg Fölsch and Olof Mellander. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1232-1239.

Synthesis of the L-, D- and DL-forms. The L-isomer is identical with the phosphorylated serine isolated from phosphoproteins.

3441 Advances in Carbohydrate Chemistry. Melville L. Wolfrom, editor. v. XII. 367 p. 1957. Academic Press, New York. (QD321 A95 Vis.)

Infrared spectra of carbohydrates; the saccharinic acids; zone electrophoresis of carbohydrates; sugar nitrates; benzyl ethers of sugars; methyl and phenyl glycosides of the common sugars; the Schardinger dextrins; molecular structure of glycogens; biosynthesis of hyaluronic acid.

3442 Preparation and Some Properties of Tung Oil Monoglycerides. R. S. McKinney and L. A. Goldblatt. *American Oil Chemists' Society, Journal*, v. 34, Dec. 1957, p. 585-587.

3443 Thermal-Diffusion Fractionation: Oils, Fats, and Some Derivatives. C. W. Seelbach and F. W. Quackenbush. *American Oil Chemists' Society, Journal*, v. 34, Dec. 1957, p. 603-606.

Thermal diffusion experiments with mono, di-, and triglycerides, fatty acids, methyl esters of fatty acids from soybean oil, polymeric triglycerides and certain trace components, particularly pigments, in crude vegetable or marine oils.

3444 Determination of the Extent of Oxidation of Fats. Ulla Holm, Kai Ekbom, and Gunnar Wode. *American Oil Chemists' Society, Journal*, v. 34, Dec. 1957, p. 606-609.

The amount of secondary oxidation products in refined and unrefined fats was determined by reaction with benzidine acetate in iso-octane absolute alcohol solution; the absorption at 350 mμ. of the yellow color was measured.

3445* (German.) New Methods in Preparative Organic Chemistry. **Neuere Methoden der präparativen organischen Chemie. X.** Alkylation of Phenols by Olefins. **Alkylierung von Phenolen mit Olefinen.** R. Stroh, R. Seydel, and W. Hahn. *Angewandte Chemie*, v. 69, no. 22, Nov. 21, 1957, p. 699-706.

By means of catalytic quantities of Al, which is soluble in phenols with formation of phenolates, it is possible to introduce olefins into phenols in the form of alkyl groups, preferably in the ortho position to the hydroxyl group.

3446* (English.) **Thiophene Chemistry. VII. Bromosubstituted Thiopheneboronic Acids and Their Diethanolamine Esters. The Directing Effect of the -B(OH)$_2$ Group in Electrophilic Substitution.** Sven-Olov Lawesson. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 387-395.

3447* (German.) Chemical and Biological Tests With Pseudo-Reductones and Their Derivatives. **Chemische und biologische Versuche mit Pseudo-Reduktonen und Derivaten derselben.** Hans von Euler and Hans Hasselquist. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 419-422.

The effect of ammonia on benzoyl formoin was studied.

3448* (English.) **Stereochemical Studies. II. The Enantiomers of α-(3-Thianaphthenyl)-propionic Acid.** Berndt Sjöberg. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 439-450.

3449 Rearrangement Studies With C^{14}. V. The Solvolysis of 2-Phenylethyl-1-C^{14} *p*-Toluenesulphonate. C. C. Lee, G. P. Slater, and J. W. T. Spinks. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1417-1422.

3450 Study of Halogenated Hydroxyphenazines. Paul E. Gagnon, Karl F. Keirstead, and Brian T. Newbold. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1423-1433.

Chlorotrihydroxydihydrophenazine was reduced, oxidized, methylated, acetylated, benzoylated, brominated, nitrosated, nitrated, and finally degraded to phenazine. Salts were also prepared.

3451 Preparation and Chemistry of Δ^5-Hexahydro-1,4,8-Pyrimidazole, Δ^5-1,5,9-Triazabicyclo(4.4.0) Decene, and Δ^5-1,4,9-Triazabicyclo (5.3.0) Decene. A. F. McKay and M.-E. Kreling. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1438-1445.

3452 Hydrogenolysis of Carbohydrates. III. Further Observations of the Reduction of Methyl α-D-Glucopyranoside. E. von Rudloff and A. P. Tulloch. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1504-1510.

Reaction at 180 to 220 C yielded, in addition to the polyols obtained at 240 C, substantial quantities of hydro-D-glucal (2-deoxy-1,5-anhydro-D-sorbitol), smaller amounts of 2-deoxy-

methyl glucoside, and the hitherto unknown hydro-D-altral, as well as trace amounts of several other unidentified deoxyglycosides and 1,5-anhydrohexitols.

3453* (English.) **On 2-Arylaminotropones. II. Bromination of 2-Anilino- and 2-(*p*-Toluidino)-tropones.** Syun Iseda. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 694-698.

3454* (English.) **Structure of Roseothricin A.** Toshio Goto, Yoshimasa Hirata, Seigo Hosoya, and Nobuhiko Komatsu. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 729-737.

Roseothricin A is regarded as identical with glucosamine.

3455 Formation and Properties of Sydnone Imines, a New Class of Meso-Ionic Compound, and Some Sydnones Related to Natural α-Amino-Acids. Peter Brookes and James Walker. *Chemical Society, Journal*, 1957, Nov., p. 4409-4416.

3456 Investigations on the Synthesis of 2-Acetyl*cyclo*hex-2-en-1-one. I. M. E. McEntee and A. R. Pinder. *Chemical Society, Journal*, 1957, Nov., p. 4419-4426.

Reduction of *o*-anisic acid by Na and ammonia yielded mainly 1:4-dihydro-*o*-anisic acid, but attempts to convert this into 2-acetyl*cyclo*hex-2-enone were unsuccessful. Chlorination and dehydrochlorination of 2-acetyl*cyclo*hexanone gave a liquid (probably 2-acetyl*cyclo*hex-3-en-1-one) and a crystalline product $C_{16}H_{20}O_4$.

3457 Urea and Related Compounds. IV. Some Aromatic and Aliphatic Dithioformamidines. Frederick Kurzer and Phyllis M. Sanderson. *Chemical Society, Journal*, 1957, Nov., p. 4461-4469.

Di-*ortho*-substituted arylthioureas are readily oxidized by Br or H_2O_2 to diaryldithioformamidines, which are isolated in the form of their salts. Dialkyl- and tetra-alkyl-dithioformamidine salts are similarly prepared.

3458 Polyfluoroalkyl Compounds of Silicon. IV. Polyfluoro-Alkyl-Silanes, -Silicones, and -Polysiloxanes Derived From Perfluoro-Alkylethylenes or Vinylsilanes. A. M. Geyer, R. N. Haszeldine, K. Leedham, and R. J. Marklow. *Chemical Society, Journal*, 1957, Nov., p. 4472-4479.

Synthesis by reaction of a compound containing an Si-H bond with a fluoro-olefin or by reaction of a polyfluoroalkyl iodide or bromide with an alkenylsilicon compound.

3459 The Preparation and Properties of 10:10-Disubstituted Phenoxsilanes. Christopher H. S. Hitchcock, Frederick G. Mann, and A. Vanterpool. *Chemical Society, Journal*, 1957, Nov., p. 4537-4546.

3460 Oxidation of Organic Sulphides. IX. The Reaction of Ozone With Organic Sulphur Compounds. D. Barnard. *Chemical Society, Journal*, 1957, Nov., p. 4547-4555.

Reaction mechanisms are suggested based upon ozone-absorption measurements, the effect of ozone on related S compounds, and rate data derived from competitive ozonolyses.

3461 Aspects of Stereochemistry. VI. Reactions of Some Epoxy-Steroids With the Boron Trifluoride-Ether Complex. H. B. Henbest and T. I. Wrigley. **VII. Metal Reduction of Vicinal Epoxy*cyclo*hexanes.** A. S. Hallsworth and H. B. Henbest. **VIII. The Reaction of *cyclo*-Hex-3-enol With Perbenzoic Acid. An Improved Method for the Isolation of Water-Soluble Epoxides.** H. B. Henbest and B. Nicholls. *Chemical Society, Journal*, 1957, Nov., p. 4596-4612.

3462 The Preparation and Properties of Aryl 2-Deoxy-α-D-glucopyranosides. F. Shafizadeh and M. Stacey. *Chemical Society, Journal*, 1957, Nov., p. 4612-4615.

These compounds are less stable towards acidic hydrolysis than the corresponding alkyl derivatives.

3463 Oxazolopyridines and Oxazoloquinolines. II. Synthesis of 2'-Hydroxyoxazolo(4':5'-2:3)pyridine and Related Compounds. *Chemical Society, Journal*, 1957, Nov., p. 4625-4627.

3464 Researches on Acetylenic Compounds. LVII. A General Synthesis of Allenic Acids. E. R. H. Jones, G. H. Whitham, and M. C. Whiting. **LVIII. The Structure of an Anomalous Reppe Carboxylation Product.** P. J. Ashworth, G. H. Whitham, and M. C. Whiting. *Chemical Society, Journal*, 1957, Nov., p. 4628-4640.

3465 The Mechanism of the Reaction of Aryl *iso*Cyanates With Alcohols and Amines. VI. Preliminary Investigations With Amines: Complex-Formation by Amines and Ureas in Benzene Solution. VII. The "Spontaneous" Reaction With Amines. VIII. The Base-Catalysed Reaction With Amines. John W. Baker and D. N. Bailey. *Chemical Society, Journal*, 1957, Nov., p. 4649-4668.

3466 The Reaction of Sulphinyl Chlorides With Zinc. D. Barnard. *Chemical Society, Journal*, 1957, Nov., p. 4673-4675.

Aryl and alkyl sulfinyl chlorides react readily with Zn, to give good yields of the corresponding thiolsulfonates instead of the expected disulfoxides.

3467* (German.) The Ozonizing and Ozone Analysis of Aromatics and Heterocyclics in Relation to the Capacity of Reaction of the Ring System. **Über Ozonisierung und Ozonolyse von Aromaten und Heterozyklen im Hinblick auf die Reaktionsfähigkeit des Ringsystems.** J. P. Wibaut. *Chimia (Switzerland)*, v. 11, no. 11, Nov. 1957, p. 321-328.

Ozone analysis of quinoline and some of its methyl homologues, γ-pyrones, pyrrol and some of its homologues, and furans.

3468* (German.) On Compounds Containing Nitrogen and Sulfur. **Über Stickstoff-Schwefelverbindungen. I.** Transformation of Amidosulfonic Acid by Melting and a New Method for Obtaining Sulfamide. **Über die beim Schmelzen von Amidosulfonsäure eintretende Veränderung und ein neues Verfahren der Sulfamiddarstellung.** J. Kubík and W. Waněk. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 3, Oct. 1957, p. 1446-1451.

Obtaining sulfamide from melted mixtures by means of hydrolysis.

3469* (German.) Oxidation With Chromium Trioxide. **Oxydationen mit Chromtrioxyd. IV.** Quantitative Study of Acid-Catalyzed Oxidation of Methylcyclohexanes. **Die quantitative Untersuchung der säurekatalysierten Oxydation des Methylcyclohexans.** J. Roček. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 3, Oct. 1957, p. 1509-1518.

Quantitative investigation of effect of acidity and temperature on the rate constant. Determinations of rates in acetic acid in the presence of sulfuric-, perchloric-, and phosphoric acids as catalyzers.

3470* (English.) **Oxidation With Chromium (VI) Oxide. V. Oxidation of Cyclohexane and *n*-Heptane.** J. Roček. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 3, Oct. 1957, p. 1519-1523.

Comparison of methylcyclohexane oxidation with oxidation of cyclohexane or *n*-heptane. Results show the difference in rate and also in mechanism; however the course of the reaction and its dependence on acidity are essentially the same.

3471* (French.) Preparation and Polycondensation of Amino-22 Behenic Acid. **Préparation et polycondensation de l'acide amino-22 béhénique.** Georges Dupont, Georges Champetier, Joseph Cohen, and Jean Philippe Pied. *Comptes Rendus*, v. 245, no. 18, Oct. 28, 1957, p. 1542-1544.

A new method for the preparation of amino-22 behenic acid, $NH_2(CH_2)_{21}CO_2H$, and of the polyamide resulting from its polycondensation.

3472* (Russian.) Methylation of Cyclopentene by Methylene Radicals That Form When Carbon Monoxide Is Reduced by Contact With Hydrogen. **O metilirovanii tsiklopentena metilenovymi radikalami, obrazuiushchimisia kontaktnym vosstanovleniem okisi ugleroda vodorodom.** Ia. T. Eidus and M. B. Ordian. *Doklady Akademii Nauk, SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 101-104.

Relationship between reaction of hydro-condensates with CO and cycloolefins.

3473* (Russian.) Some Silicon Hydrocarbons of the Disilane Methane and Disilane Ethane Series. **Nekotorye kremniiuglevodorody riada disilanmetana i disilanetana.** A. V. Topchiev, N. S. Nametkin, and F. F. Machus. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 248-250.

Preparation of seven Si hydrocarbons and their properties.

3474* (Russian.) Direct Substitution of Hydrogen in Organic Compounds by Thallium (Thallation). **Reaktsiia priamogo zameshcheniia vodoroda v organicheskikh soedineniiakh na tallii (tallirovanie).** V. P. Glushkova and K. A. Kocheshkov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1186-1192.

Thallation of benzene, toluene, naphthalene, anisole, phenetole, 1,2-dimethoxybenzene, 1,3-dimethoxybenzene, 1,4-dimethoxybenzene, 1,3,5-trimethoxybenzene, thiophene, acetophenone, and benzofuran.

3475* (Russian.) Some Transformations of Silico-Organic Compounds With Functional Groups at α and γ Positions in Relation to the Silicon Atom. **Nekotorye prevrashcheniia kremneorganicheskikh soedinenii s funktsional'nymi gruppami v α- i γ-polozheniiakh otnositelno atoma kremniia.** V. F. Mironov and N. A. Pogonkina. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1199-1205.

Comparing the reactivity of the $R_3Si(CH_2)_nX$ type of compound, where n=1 and 3, and X represents the functional groups: -Cl, -SCN, $-N(C_2H_5)_2$, and $-O_2CCH_3$ in several reactions.

3476* (Russian.) Polymerization and Copolymerization of N-Vinyl Compounds. **Polimerizatsiia i sopolimerizatsiia n-vinil'nykh soedinenii. III.** Synthesis of N-Vinyl Imides of Succinic, Phthalic, and Naphthalic Acids. **Sintez n-vinilimidov iantarnoi, ftalevoi i naftalevoi kislot.** A. F. Nikolaev and S. N. Ushakov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1235-1238.

Synthesis of vinyl naphthalimide according to the scheme: naphthalic anhydride → β-oxyethylnaphthalimide → β-acetoxyethyl naphthalimide → vinyl naphthalimide.

3477* (Russian.) Vinyl Compounds in Diene Synthesis. **Vinilovye soedineniia v dienovom sinteze. I.** Interaction of Some Vinyl Ethers With Cyclopentadiene and Hexachlororcyclopentadiene. **Vzaimodeistvie nekotorykh prostykh vinilovykh efirov s tsiklopentadienom i geksakhlortsiklopentadienom.** M. F. Shostakovskii, A. V. Bogdanova, and T. M. Ushakova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1245-1249.

Reactions of vinyl butyl, vinyl cyclohexyl, and vinyl phenyl ethers with cyclopentadiene and hexachlorocyclopentadiene.

3478 Studies on Glyceryl Esters. I. The Formation of Urea Inclusion Compounds With 1-Monoglycerides. F. Aylward and P. D. S. Wood. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 583-589.

The 1-monoglycerides of saturated even numbered acids from caprylic to stearic will form adducts with urea. The adducts normally crystallize in flat hexagonal plates in contrast to the needles characteristic of most lipid adducts. Molecular weight ratios of urea of lipid were determined.

3479* (Russian.) The Mechanism of the Interaction of Ethyl Diazoacetate With Hydrocarbon Halides. **O mekhanizme vzaimodeistviia diazouksusnogo efira s galoidoproizvodnymi uglevodorodov.** L. P. Danilkina, T. V. Domareva, and I. A. D'iakonov. *Leningradskogo, Universiteta, Vestnik, Seriia Fiziki i Khimii*, v. 12, no. 16, 1957, p. 131-147.

Interaction between ethyl diazoacetate and triphenylchlormethane, diphenyldichlormethane, 9-bromofluorene, 9-9-dibromofluorene, chloroform, ethyl α-bromo-ββ-diphenylpropionate and ethyl α-bromo-βββ-triphenylpropionate in the presence of Cu catalysts, and the photochemical reaction with allylbromide. A free radical chain reaction is indicated.

3480* Diazomethane as a Reagent for Microsynthesis. Robert Roper and T. S. Ma. *Microchemical Journal*, v. 1, no. 2, 1957, p. 245-260.

Construction and operation of microgenerator which conveniently produces small amounts of diazomethane. Procedures for micro-preparation of the methyl ester, pyrazoline, and diazoketone, as well as conversion of the diazoketone to the acetoxymethyl ketone or to a substituted acetamide.

3481* (Russian.) Synthesis of Hydrocarbons. **Sintez uglevodorodov. LXII.** Method of Snythesis of Alkenes and Alkanes of Branched Composition. **Metod sinteza alkenov i alkanov razvetvlennogo stroeniia.** R. Ia. Levina, P. A. Kaikaris, and E. G. Treshchova. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 165-168.

Synthesis of ethylene hydrocarbons containing, besides the tertiary, one quaternary carbon atom. Reaction of allyl halides with tertiary alkyl magnesium chlorides is described.

3482* (Russian.) Contact-Catalytic Isomerization of Meta-Xylene on Aluminum Oxide and Silica. **Kontaktno-kataliticheskaia izomerizatsiia meta-ksilola na okisi aliuminiia i kremnezeme.** N. I. Shuikin and Dashzhamts Batyn. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 247-251.

Isomerization of *m*-xylene into *p*- and *o*-isomers in contact with aluminum oxide in an atmosphere of HCl and steam.

3483* (Polish.) The Occurrence of Complex Compounds of Calcium Chloride and Urea in Aqueous Solutions. **Występowanie zwiazków kompleksowych chlorku wapnia z mocznikiem w roztworach wodnych.** A. Barański, B. Baranowski, and M. Sarnowski. *Przemysł Chemiczny*, v. 13, no. 9, Sept. 1957, p. 505-506.

Seven complex compounds in the system $CaCl_2$-urea-H_2O were found by the viscometric method.

3484* (Polish.) Study of the Hydrogenation of Phenol to Cyclohexanol. **Z badań nad uwodornianiem fenolu do cykloheksonolu. Kinetyka uwodorniania i możliwości otrzymywania cykloheksanonu jako zwiazku pośredniego.** I. Borecka and E. Treszczanowicz. *Przemysł Chemiczny*, v. 13, no. 9, Sept. 1957, p. 537-540.

Shows that cyclohexanone may be formed directly from phenol as an intermediate in the process of hydrogenation to cyclohexanol, or as a product of secondary dehydrogenation of cyclohexanol.

3485* (Russian.) Investigation in the Field of Snythesis of Silicon-Organic Compounds. **Issledovanie v oblasti sinteza kressniiorganicheskikh soedinenii. III.** Study of Direct Synthesis of Methylchlorosilanes. **Izuchenie reaktsii priamogo sinteza metilkhlorsilanov.** A. L. Klebanskii and V. S. Fikhtengol'ts. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2648-2653.

Temperature of the reaction and duration of contact are the main factors influencing the decomposition of methyl radicals.

3486* (Russian.) The Reaction of Chloralkylalkyldichlorosilanes With Aromatic Compounds in the Presence of $AlCl_3$. **Vzaimodeistvie khloroalkilalkildikhlorsilanov s aromaticheskimi soedineniiami v prisutstvii $AlCl_3$.** E. A. Chernyshev, M. E. Dolgaia, and Iu. P. Egorov. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2676-2681.

Chloroalkylalkyldichlorosilanes are successfully used as silicoalkylating agents of aromatic compounds in the Friedel-Crafts reaction.

3487* (Russian.) The Reaction of Alkylhalosilanes With Trialkylsilanes. **Reaktsiia alkilgalogensilanov s trialkilsilanami.** B. N. Dolgov, S. N. Borisov, and M. G. Voronkov. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2692-2697.

The reaction of trialkylsilanes with alkylchloro (-bromo) silanes, occuring under the influence of $AlCl_3$, is a simple and fast method for obtaining alkylsilanes and dialkylsilanes.

3488* (Russian.) Reactions of Silicon-Organic Compounds With Phosphoryl Chlorides. **Reaktsii vzaimodeistviia kremniiorganicheskikh soedinenii s khlorangidridanii fosfora.** A. P. Kreshkov and D. A. Karateev. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2715-2720.

Study of tetramethoxysilane, tetraethoxysilane, tetra-n-butoxysilane, and tetra-O-cresoxysilane with $POCl_3$, and of tetraphenoxysilane with PCl_3. Three new silicophosphorous organic compounds were obtained.

3489* (Russian.) Synthesis of α,β-Dimercaptopropionic Acid Containing Radioactive Sulfur. **Sintez α,β-dimerkaptopropionovoi kisloty, soderzhaschei radioaktivnuiu serv.** A. B. Silaev, An. N. Nesmeianov, V. M. Fedoscev, and N. V. Kondakova. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2871-2873.

Made by direct sulfhydration of the dibromine-propionic acid.

3490* (Russian.) Synthesis of Diethylaminoethanol Marked by Radiocarbon C^{14} in One of the Ethyl Groups. **Sintez dietilaminoetanola, mechennogo radiouglerodom C^{14} v odnoi iz etil'nykh grupp.** L. B. Dashkevich. *Zhurnal Obshchei Khimii*, v. 27, no. 10, Oct. 1957, p. 2874-2875.

See also: **3152** (reaction of Rauwolfia to nitrite); **3342** (classification of organic compounds); **4564** (butadiene dimers).

CHEMISTRY—PHYSICAL

3491* (English.) **Characterization of Polyelectrolyte Solutions. I. Molecular Fractionating on Ion Exchange Resins. II. Separation of Strong and Weak Acids by Means of Ion Exclusion.** Nils Hartler. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1162-1172.

3492* (English.) **Ion Exchange Equilibria. I. Sodium-Zinc, Sodium-Copper, Sodium-Manganese in Nitrate Solutions. II. A Study of the Association in Sodium Polymetaphosphate Solutions Containing Zinc, Copper, and Manganese.** Ralph Djurfeldt and Olof Samuelson. *Acta Chemica Scandinavica*, v. 11, no. 7, 1957, p. 1209-1222.

3493* (German.) The Mechanism of the Light Absorption of Cobaltic Complexes. **Über den mechanismus der Lichtabsorption der Kobalti-Komplexe.** Á. Kiss, J. Császár, and L. Lehotai. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 12, no. 1, 1957, p. 73-81.

The appearance of bands of term cleavage in diamagnetic complexes are explained by the binding electrons filling the *d*-electron shell of the cobalt ion so as to permit term cleavage.

3494* (German.) Adsorption of Ethylene by Active Carbon Suspended in Water. **Die Adsorption des Äthylens an in Wasser Suspendierter Aktivkohle.** T. Erdey-Grúz and F. Nagy. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 12, no. 1, 1957, p. 101-114.

Adsorption apparatus operates under constant pressure. The adsorption of ethylene by dry active C and by active C in an aqueous suspension was determined.

3495* (Russian.) Study of Electrical Conductivity of Sodium Silicate Solutions. **Izuchenie elektroprovodnosti rastvorov silikata natriia.** M. G. Manvelian, T. V. Krmoian, and A. G. Eganian. *Akademiia Nauk Armianskoĭ SSR, Izvestiia, Seriia Khimicheskikh Nauk*, v. 10, no. 4, 1957, p. 225-236.

An attempt to clear up some questions concerning ionic structures of sodium silicate solutions.

3496 Properties of Water. I. Pressure-Volume-Temperature Relations in Steam to 1000 C and 100 Bars Pressure. George C. Kennedy. *American Journal of Science*, v. 255, Dec. 1957, p. 724-730.

3497* (English.) **The Absorption Spectrum and Dissociation Constants of 4-Hydroxybenzthiazole.** Quintus Fernando and T. Thirunamachandran. *Analytica Chimica Acta*, v. 17, no. 5, Nov. 1957, p. 447-452.

The spectra of 4-hydroxybenzthiazole and the parent compound, benzthiazole, were determined in acidic, basic, and neutral solutions, and compared with the corresponding spectra of 8-hydroxyquinoline and quinoline.

3498* (French.) Investigations of the Magnetism of the Totally Delocalized Chemical Linkage. **Recherches sur le magnétisme de la liaison chimique totalement délocalisée.** André Marchand. *Annales de Chimie (Paris)*, v. 2, nos. 7-8, July-Aug. 1957, p. 469-526.

A study of delocalization of the π linkage and of the production of magnetic properties in graphite. Magnetic susceptibility of ten carbon blacks and of InSb. Development of the properties of aromatic carbides and graphite.

3499* The Removal of Radon From CO_2 for Use in ^{14}C Age Measurements. H. L. De Vries. *Applied Scientific Research*, v. 6, sec. B, no. 6, 1957, p. 461-470.

Traces of radon can be extracted from CO_2 by pumping off from solid CO_2. Enrichment of radon at that wall where the CO_2 condenses is avoided by stirring the gas. An estimate of the fraction of radon, adsorbed on the wall, demonstrates the necessity of performing the condensation at about −80 C.

3500* (German.) The Kinetics of Reductones and Psuedo-Reductones. **Zur Kinetik der Reduktone und Pseudo-Reduktone. II.** Hans von Euler and Hans Hasselquist. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 407-417.

Test on the time slope of the Tillmans-reagent-reduction at varying pH.

3501* (English.) **Optical Resolution and Configuration of α-Phenylglutaric Acid.** Lars Westman. *Arkiv för Kemi*, v. 11, no. 5, 1957, p. 431-437.

3502 Summarized Proceedings of a Conference on X-Ray Analysis—Cardiff, April, 1957. P. Gay and P. J. Wheatley. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 427-435.

Topics discussed were the structures of minerals and inorganic compounds.

3503 The Carbon Dioxide-Hydrogen Sulphide-Methane System. I. Phase Behaviour at 100°F. D. B. Robinson and J. A. Bailey. *Canadian Journal of Chemical Engineering*, v. 35, Dec. 1957, p. 151-158.

Analysis of the vapor and liquid phases in equilibrium at 600, 1200, and 1800 psi. permitted a calculation of equilibrium ratios and activity coefficient ratios as a function of pressure and composition. Activity coefficient ratios indicated the liquid solutions to be non-ideal under most of the conditions investigated.

3504 Addition of *n*-Butyl Mercaptan to 1-Pentene on Irradiation With X-Rays or Gamma Rays. I. 140 KVP. X-Rays. II. Effect of Rigorous Drying and Degassing. III. Energy Dependence, 140 KVP. to 24.5 MEVP. A. Fontijn and J. W. T. Spinks. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1384-1413.

3505 The Analysis of Nuclear Magnetic Resonance Spectra. III. Pyridine and Deuterated Pyridines. W. G. Schneider, H. J. Bernstein, and J. A. Pople. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1487-1495.

3506 The Temperature Dependence of Apparent Dielectric Constants of Adsorbates on Non-Porous Titanium Dioxide. S. E. Petrie, R. McIntosh, and E. W. Channen. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1534-1541.

3507* (English.) **The Effect of Organic Vapors on the Stability of Aerosols.** Yoshiyasu Fujitani. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 683-689.

The rate of coagulation in the presence of vapors was observed by means of the ultramicroscopic method, using fogs of aqueous NH_4Cl, glycerol, and diocetyl phthalate.

3508* (English.) **The Bond Refraction Values for Ti-O in Organic Titanates.** Tooru Takatani. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 705-708.

3509* (English.) **Hydrogen Bonding Effect on the Fluorescence of π-Electron System. III. Fluorescence Quenching of Some Nitrogen Heterocycles Caused by Hydrogen Bond Formation.** Noboru Mataga and Shizuyo Tsuno. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 711-715.

Hydrogen bonding effect on the fluorescence of acridine, 3,6-diaminoacridine, and 3,6-bisdimethylaminoacridine was studied in a non-polar solvent containing proton donors such as phenol, naphthols, aniline, or pyrrole.

3510* (English.) **Spectrochemical Study of Microscopic Crystals. XV. Structure and Light Absorption of Bis-(Dimethylglyoximato) Gold(III) Dichloro-Aurate(I).** Shoichiro Yamada and Ryutaro Tsuchida. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 715-717.

Dichroism was determined in the visible and the ultra-violet region by the microscopic method. For the absorption band at about 60-70x10^{13} sec.$^{-1}$, absorption was about four and a half times as strong along the complex plane as along the direction normal to the plane.

3511* (English.) **An Account on the Infrared Absorption of Guanidiniums.** Toshio Goto, Koji Nakanishi, and Mamoru Ohashi. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 723-725.

Data on guanidine carbonate and ten guanidine hydrochlorides.

3512* (English.) **Studies on the Mechanism of Eder's Reaction. II. On the Properties of the Active Oxalic Acid in Manganese(III and VII) Oxalate Reaction Systems.** Shukichi Sakuraba and Syozo Ikeva. *Chemical Society of Japan, Bulletin*, v. 30, no. 7, Oct. 1957, p. 748-752.

3513 Aromatic Reactivity. II. The Cleavage of Aryltrimethylsilanes by Bromine in Acetic Acid. C. Eaborn and D. E. Webster. *Chemical Society, Journal*, 1957, Nov., p. 4449-4456.

Kinetic study of the reaction between Br and substituted phenyltrimethylsilanes in acetic acid containing 1.5% of water.

3514 Exchange Studies of Certain Chelate Compounds of the Transitional Metals. III. Exchange and Electron-Transfer Reactions Involving Phenanthroline and Dipyridyl Complexes of Cobalt(III). Peter Ellis, R. G. Wilkins, and M. J. G. Williams. *Chemical Society, Journal*, 1957, Nov., p. 4456-4461.

3515 The 720 cm.$^{-1}$ Band in the Infrared Spectra of Crystalline Long-Chain Compounds. D. Chapman. *Chemical Society, Journal*, 1957, Nov., p. 4489-4491.

Correlation between the appearance of the band associated with the CH_2 rocking mode in the 720 cm.$^{-1}$ region of the spectra of crystalline long-chain compounds and the type of packing of the chains.

3516 Molecular Polarisation and Molecular Interaction. VII. The Apparent Dipole Moments of Some Di- and Tri-Substituted Anilines in Benzene and Dioxan. J. W. Smith and S. M. Walshaw. *Chemical Society, Journal*, 1957, Nov., p. 4527-4532.

Date on 2:4- and 3:5-dibromoaniline, 2:4- and 3:5-dinitroaniline, 2:4: 6-trinitroaniline, and 2-methyl-4-nitroaniline.

3517 Spectrophotometry in the Far Ultraviolet Region. Absorption Spectra of Some Amides and Cyclic Imides. D. W. Turner. *Chemical Society, Journal*, 1957, Nov., p. 4555-4558.

Spectra of nine simple cyclic imides in the 1750-2000 Å region in aprotic solvents, together with those of related amides; effect on intensity of progressive C_α-alkyl substitution.

3518 The Mechanism of Oxidation of α-Glycols by Periodic Acid. II. Propane-1:2-, 2-Methylpropane-1:2-, Butane-2:3- and 2-Methylbutane-2:3-diol. III. Spectroscopic Evidence for the Formation of an Intermediate. G. J. Buist, C. A. Bunton, and J. H. Miles. **IV. The Oxidation of 2-Methylbutane-2:3-diol at pH 4·5.** G. J. Buist and C. A. Bunton. *Chemical Society, Journal*, 1957, Nov., p. 4567-4584.

3519 Induction Effects in the Oxidation of Bisulphite Ion at pH 4. G. A. Bottomley and W. R. Cullen. *Chemical Society, Journal*, 1957, Nov., p. 4592-4595.

The rate of O absorption by bisulphite solutions at pH 4 in the presence of Cu^{2+} and Mn^{2+} was studied with emphasis on the phenomena occurring when the O supply is temporarily withdrawn. Such absorption is most satisfactorily explained by a slow reaction of the metal catalyst with the sulfite solution.

3520 The Effect of Solvents on the Ionisation of Organic Halides. V. Ionisation in Mixed Solvents. Alwyn G. Evans, I. H. McEwan, and J. H. Thomas. *Chemical Society, Journal*, 1957, Nov., p. 4644-4649.

The ionization of triphenylmethyl chloride in *m*-cresol-benzene and -hexane, and of tri-*p*-tolylmethyl chloride in *m*-cresol-benzene, -hexane, and -acetic acid was investigated spectrophotometrically.

3521* (German.) High Activity Mixed Catalysts of Nickel-Magnesium Oxide, Obtained by Decomposition of Oxalates in High Vacuum. **Hochaktive, durch Zersetzung von Oxalaten im Hochvakuum hergestellte Nickel-magnesiumoxyd-Mischkatalysatoren.** V. Daneš and P. Jírů. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1547-1563.

Dependence of activity of Ni-MgO mixed catalysts on their composition. Measurement of their surface area by physical adsorption of Ar and determination of porosity distribution in some specimens.

3522* (English.) **Effect of Substituents in Position Two on the Polarographic Reducibility of Tropone.** F. Šantavý, B. Jámbor, A. Němečková, J. Mollin, and J. Bartek. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1655-1660.

The effect of substituents in position two of the tropone nucleus on its polarographic reducibility. Arrangement of different substituents according to their effect on the half-wave potential (extrapolated for pH O) in a series analogous to that derived for the effect of *ortho*-substituents in benzaldehyde. Compounds on which the substituent in position two does not confer pseudoaromatic properties undergo four-electron reduction, whereas all other tropolone derivatives are reduced by two electrons in neutral solution. The mechanism of these reductions.

3523* (French.) Oxidation of Ferrous Ions in Acid Solution by Polonium α-Rays. **Oxydation des ions ferreux en solution acide par les rayons α du polonium.** Marc Lefort. *Comptes Rendus*, v. 245, no. 19, Nov. 4, 1957, p. 1623-1626.

The ferrous ions in an aqueous solution of H_2SO_4 are oxidized by the α-rays of Po with a G yield of 5.6 ± 0.1 in the presence of air and 3.65 ± 0.1 without air. For 2x10^{-3} M, the yield goes down to 0.95 without air. Yields of combined radicals of H_2O_2.

3524* (French.) Absorption Spectrum of Sulphur Dioxide With Millimeter Waves. **Spectre d'absorpton de l'anhydride sulfureux aux ondes millimétriques.** Raymond Wertheimer and Maurice Clouard. *Comptes Rendus*, v. 245, no. 21, Nov. 18, 1957, p. 1793-1794.

Frequencies of nine recently determined bands in the rotation spectrum of SO_2.

3525* (French.) Intensification by Means of Electric Fields of the Sensitiveness to X-Rays in Some Luminescent and "Photo-Luminescent-Products". **Renforcement par les champs électriques de la sensibilité aux rayons X de certains produits luminescents et "photo-électroluminescence".** Georges Destriau. *Comptes Rendus*, v. 245, no. 21, Nov. 18, 1957, p. 1797-1800.

A study of luminance waves obtained by different phase displacements between the electric field and the X-ray impulses. Results cast doubts on the Cusano-Williams' hypothesis on the intensification of electric fields.

3526 The Microwave Spectrum and Structure of Trichloracetonitrile. J. G. Baker, D. R. Jenkins, C. N. Kenney, and T. M. Sugden. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1397-1401.

The most probable structure is C-H = 1.158 Å, C-C = 1.460 Å, C-Cl = 1.770 Å, and the C-C-Cl bond angle = 109° 56′.

3527 The Measurement of Hydroxyl and Carboxyl End Groups in Polyethylene Terephthalate. I. M. Ward. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1406-1412.

Method involves determining the total end-group content by measuring the deuterium content of the water obtained from combustion of deuterated polymer, in which the H of these end-groups is replaced by deuterium. Deuteration was carried out by repeated immersion of the polymer in pure D_2O.

3528 The Thermo-Osmosis of Gases Through Polymers. The Transient Approach to the Steady State. C. M. Crowe. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1413-1422.

Equations, derived for the gradual change of the pressure difference across the film towards an eventual steady state, extend beyond those of Denbigh and Raumann, apply to differing and changing volumes of gas, and permit the convenient use of U-tube manometers.

3529 The Pyrolysis of *n*-Butanol. J. A. Barnard. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1423-1430.

Reaction is homogeneous and first order in the initial pressure range 20-500 mm. The proposed mechanism involves fission of the molecule at the $C_2H_5CH_2OH$ bond, followed by decomposition of the *n*-propyl radical into a methyl radical and ethylene.

3530 The Pyrolysis of Cadmium Dimethyl and Dissociation Energies of the Cadmium-Carbon Bonds. Catherine M. Laurie and L. H. Long. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1431-1436.

The reaction below 300 C is partly homogeneous and partly heterogeneous, the products being Cd, methane, ethane, ethylene, and a solid methylene polymer. The velocity constant of the homogeneous reaction at 258 C is 1.43×10^{-5} sec^{-1}.

3531 The Crystallization of Silver Chromate in Aqueous Solutions. J. R. Howard and G. H. Nancollas. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1449-1454.

Induction periods in the crystal growth, observed under certain conditions, have been interpreted as surface contamination by a hydrolysis product. The crystallization follows a third-order equation.

3532 The Adsorption of Vapours on Pyrex Glass and Its Influence in the Measurement of Virial Coefficients. G. A. Bottomley and C. G. Reeves. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1455-1461.

Numerical results are presented for the adsorption on Pyrex glass of seven organic vapors at temperatures of 10, 22, and 35 C and at pressures considerably below atmospheric pressure.

3533 CO_2 Chemisorption on Evaporated Metal Films. A. C. Collins and B. M. W. Trapnell. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1476-1482.

The interaction of CO_2 with evaporated films of 12 metals was studied between −78 and +70 C.

3534 Free Radicals in Solution. Cheves Walling. 631 p. 1957. John Wiley & Sons, New York. (QD501 W15f)

Non-chain processes in which radicals are produced by thermal dissociation of weak bonds, photochemical reactions, oxidation-reduction processes, and in other ways. Kinetics of radical chain processes and relations between structure and reactivity in radical reactions.

3535* (French.) A Study of the Adsorption of Water Vapor by Activated Alumina and of the Dynamic Drying of Gases. **Étude de l'adsorption de la vapeur d'eau par l'alumine activée, et du séchage dynamique des gaz.** Joseph Sanlaville. *Génie Chimique (Supplement to Chimie & Industrie)*, v. 78, no. 4, Oct. 1957, p. 102-122.

3536* Emission Spectrum of Bromine Excited in the Presence of Argon. I. Putcha Venkateswarlu and R. D. Verma. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Oct. 1957, p. 251-264 + 2 plates.

Spectrum consists of a short discrete band system in the region 3150-2970 Å, an extensive discrete band system in the region 2950-2670 Å, a short and weak discrete system in the region 2660-2690 Å, and a set of diffuse bands in the region 3340-3190 Å.

3537* The Rate of Hydrolysis of Chloroacetamide in Aqueous Acid. Sundaresa Soundararajan and Marjorie J. Vold. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Oct. 1957, p. 303-308.

In 0·3N H_2SO_4 the hydrolysis follows a bimolecular law with an activation energy and activation entropy both greater than the corresponding quantities for acetamide in accord with predictions based on the charge distribution. However, at even slightly lower acidity the free energy of activation is a continuous function of the hydrogen ion concentration becoming more positive with decreasing acidity in the range studied.

3538 Constant Pressure Method for Determining *P-V-T* Relations of Gases. Ludwig Luft. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2035-2039.

Method is based on determination of volume change of a system on injection of a known mass of gas, at constant temperature and essentially constant pressure.

3539 Thermal Conductivity of Propane. D. E. Leng and E. W. Comings. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2042-2045.

Pressure-thermal conductivity isotherms were determined for propane up to 280 atm. at temperatures from 122 to 284 F.

3540* (Russian.) Studies of Physical and Chemical Properties of WS_2 Catalysts. **Issledovanie fizicheskikh i khimicheskikh svoistv WS_2-katalizatorov. I.** Effect of Thermal Treatment on the Composition and Adsorption Properties of WS_2 Obtained via Decomposition of Ammonium Sulfotungstate. **Vliianie termicheskoi obrabotki na sostav i adsorbtsionnye svoistva WS_2, poluchennogo razlozheniem sul'fovol'framata ammoniia.** S. M. Samoilov and A. M. Rubinshtein. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1158-1165.

3541 Chemical Effects of Ionizing Radiations on Aqueous Inorganic Solutions. Edwin J. Hart. *Journal of Chemical Education*, v. 34, Dec. 1957, p. 586-593.

Chemical changes induced in aqueous solutions under irradiation by α-, X-, or γ-rays. Mechanism of free radical formation, principles of chemical dosimetry; determination of primary yields of molecular products and free radicals; kinetics of some chemical reactions in aqueous solutions.

3542 Superiority of the Poeschl-Teller Potential to That of Morse for Diatomic Molecules. Charles L. Beckel. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 998-1001.

The accuracies of the Poeschl-Teller and Morse functions as vibrational potential energies are compared for the ground electronic states of 67 diatomic molecules.

3543 Thermal Exchange of Iodine With Methyl Iodide and With Hydrogen Iodide in the Gas Phase. Henry Schmied and Richard W. Fink. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1034-1040.

Between 60 and 140 C the exchange is strongly surface sensitive and follows the rate law: $R = k_1 (CH_3I) (I_2) + k_2 (CH_3I)$.

3544 Diffusion Coefficients of the Systems Xe-Xe and Ar-Xe. L. Amdur and T. F. Schatzki. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1049-1054.

The diffusion of radioargon, Ar^{37}, and of radioxenon, Xe^{131m}, through inert Xe was measured at −78, 0, 57, and 105 C.

3545 Nuclear Quadrupole Coupling in the Alkali Chloroiodides. I. Chlorine Resonances. C. D. Cornwell and R. S. Yamasaki. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1060-1067.

Chlorine resonance frequencies are reported for the following at 298, 194, and 77 K: $CsICl_2$, $KICl_2$, $KICl_2 \cdot H_2O$, $CsICl_4$, $RbICl_4$, $KICl_4$, $KICl_4 \cdot H_2O$, $NaICl_4 \cdot 2H_2O$. Variations due to crystal effects in these substances amount in most cases to less than a megacycle.

3546 Rates and Mechanisms of Protolysis of Di- and Trimethylammonium Ions Studied by Proton Magnetic Resonance. A. Loewenstein and S. Meiboom. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1067-1071.

In the *p*H range from 3 to 5 the main mechanism is: $RHN^+ + RN \leftrightarrows RN + RNH^+$. The reaction involves water in nearly every exchange. The measured rate constants are 6.0×10^8 and 3.1×10^8 $sec^{-1}M^{-1}$ for di- and trimethylammonium respectively.

3547 Entropy, Heat Capacity, and Heats of Transition of 1,2,4-Trimethylbenzene. William E. Putnam and John E. Kilpatrick. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1075-1080.

Exhibits two melting points: at 229.33 ± 0.03 K and at about 224.2 K. The only solid phase having reproducible heat capacities was the one having the higher melting point. The entropy of the ideal gas at 25 C and 1 atm. pressure was 99.59 ± 0.15 cal/deg mole.

3548 Nuclear Magnetic Resonance Study of Liquid Crystal Transitions. W. R. Runyan and A. W. Nolle. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1081-1087.

The spin-lattice relaxation time and the transverse relaxation time are determined, by the spin-echo nuclear magnetic resonance method, for the isotropic-liquid state of the liquid-crystal

compounds *p*-azoxyanisole, cholesteryl benzoate, cholesteryl *n*-butyrate, and cholesteryl propionate.

3549 Theory of the Effects of Exchange on the Nuclear Fine Structure in the Paramagnetic Resonance Spectra of Liquids. Daniel Kivelson. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1087-1098.

3550 Vibrational Spectra and Structure of Phosphonium and Deutero-Phosphonium Iodides. J. V. Martinez and E. L. Wagner. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1110-1113.

The infra-red spectra of sublimed films of PH_4I and PD_4I were obtained at −78 and −190 C in the region 4000-400 cm^{-1}. Powder and Nujol mull spectra were obtained at room temperature.

3551 Combined Catalysts as Revealed by Electron Diffraction. S. Yamaguchi. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1114-1115.

Three types of catalysts are distinguished from the results obtained. Either the substrate or the promotor predominates in the surface of the catalyst particle. There is another distribution of particles of solid phases in which neither phase envelops the other.

3552 Organic Ions in the Gas Phase. V. $C_6H_5^+$ Ion From Toluene. Paul N. Rylander and Seymour Meyerson. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1116-1117.

The $C_6H_5^+$ ion obtained by electron impact is not formed simply by cleavage of the phenyl-methyl bond, as has been assumed, and may not be a phenyl ion at all.

3553 Ionization of Strong Electrolytes. V. Proton Magnetic Resonance in Sulfuric Acid. G. C. Hood and C. A. Reilly. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1126-1128.

The proton magnetic resonance shifts in solutions of sulfuric acid were measured and degrees of dissociation calculated. The results are consistent with information derived from the intensities of Raman lines.

3554 Electronegativity of Radicals. A Method of Calculation. J. K. Wilmshurst. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1129-1131.

Gordy's expression, relating the electronegativity of an atom with the number of electrons in the valence shell and the covalent bond radius, was extended to the calculation of the group electronegativity of a radical.

3555 Dissociation of CO^+ and CO^{++} Ions by Collision With Neutral Molecules. C. E. Melton and G. F. Wells. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1132-1141.

CO^+ dissociates into C^+ and O, or C and O^+, depending upon the energy of the parent ion. Energy for the dissociation of CO^{++} is derived from the electronic energy of the molecular ion rather than from kinetic energy.

3556 Reactions of Nitrogen Atoms. I. Oxygen and Oxides of Nitrogen. G. B. Kistiakowsky and G. G. Volpi. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1141-1149.

Several reactions of N atoms were investigated in a low-pressure flow system, using the principle of a "stirred reactor' and a mass spectrometer for the determination of steady-state concentrations.

3557 Vibrational Relaxation Times in Nitrogen. S. J. Lukasik and J. E. Young. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1149-1155.

By means of a technique involving an acoustical resonant cavity, the vibrational relaxation time in N was measured at 1186, 1020, and 778 K. The lifetime of an excited vibrational level in N at the above temperatures is 2.29 X 10^6, 4.55 X 10^6, and 6.55 X 10^6 collisions, respectively.

3558 Stretching Vibrations in Condensed Systems: Especially Bonds Containing Hydrogen. A. M. Benson, Jr. and H. G. Drickamer. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1164-1174.

Measurements were made of vapor-liquid shifts and of the shifts with pressure to 10,000 atm. From the results, an attempt was made to estimate the relative importance of dispersion, induction, orientation, and repulsion (overlap) energies.

3559 Structure of Gaseous Chloropicrin as Determined by Electron Diffraction. W. M. Barss. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1260-1266.

The electron diffraction pattern of chloropicrin vapor is shown to be consistent with a molecular model in which the nitro group is freely rotating about the symmetry axis of the molecule, the C-N bond. The length of this bond appears to be greater than in nitromethane by about 8%.

3560 Paramagnetic Resonance in Trivalent Transition Metal Complexes. H. S. Jarrett. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1298-1304.

Paramagnetic-resonance absorption was observed in complexes of acetylacetone with the trivalent transition metals Ti, Cr, Fe, Mo, and Ru, also in complexes of trifluoroacetylacetone with Cr and Fe and in the complex Cr (III) hexafluoroacetylacetonate.

3561 Infrared Spectra and Vibrational Assignment of Monomeric Formic Acid. Roger C. Millikan and Kenneth S. Pitzer. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1305-1308.

The spectra of monomeric HCOOH, HCOOD, DCOOH, and DCOOD were studied in the gaseous phase with emphasis on the 800 to 450 cm^{-1} region.

3562 Reinvestigation of the Molecular Structure of 1,3,5,7-Cyclooctatetraene by Electron Diffraction. O. Bastiansen, Lise Hedberg, and Kenneth Hedberg. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1311-1317.

3563 Thermoluminescence and Coloration of Lithium Fluoride Produced by Alpha Particles, Electrons, Gamma Rays, and Neutrons. Frederick F. Morehead and Farrington Daniels. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1318-1324.

3564 Studies of Color Centers in Polycrystalline Compressed Pellets of Alkali Halides. Herbert N. Hersh. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1330-1338.

Compressed and uncompressed powders of KCl, KBr, KI, and CsI were colored by X-rays and chemical addition and their spectra measured.

3565 Neighbor Interactions and Symmetric Properties of Polyelectrolytes. Shenior Lifson, Bruria Kaufman, and Hanna Lifson. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1356-1362.

The grand partition function of polyelectrolyte molecules, considered as linear Ising chains, is studied with respect to certain symmetry properties of these systems. Equations for the *p*H, the degree of ionization, and the buffering capacity are derived explicitly for a model in which only the interactions between first- and second-neighbors are taken into account.

3566 Substituted Benzene Spectra. Lionel Goodman and Harrison Shull. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1388-1400.

The low-lying π-electron excited states of substituted benzenes are examined from a semiempirical point of view, by using molecular orbital theory together with first-order configuration interaction as a basis.

3567 Infrared Intensities and Bond Moments in $CO^{12}O^{18}$. D. F. Eggers, Jr. and C. B. Arends. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1405-1410.

3568 Interaction of Inorganic Macromolecular Systems With Surface-Active Agents. J. Fred Hazel and Harold O. Strange. *Journal of Colloid Science*, v. 12, Dec. 1957, p. 529-537.

Several of the systems and ionic surface-active agents have been studied in relation to the effect of the surface-active agents on the stability of colloidal suspensions of the inorganic substances. Iron(III) oxide, Al_2O_3, MnO_2, and As_2S_3 comprised the inorganic systems. Potassium salts of a series of fatty acids, alkyl sodium sulfates, alkyl amine hydrochlorides, and alkyl pyridinium chlorides were used as the colloidal electrolytes.

3569 The Titration of Polymeric Acids. R. Arnold. *Journal of Colloid Science*, v. 12, Dec. 1957, p. 549-556.

Data in the literature for the titration of polyacrylic and polymethacrylic acids are considered.

3570* Infrared Emission Spectrum of Silicon Carbide Heating Elements. James E. Stewart and Joseph C. Richmond. *Journal of Research, National Bureau of Standards*, v. 59, Dec. 1957, p. 405-409.

The spectral emittance of SiC seems to be independent of temperature in the range 482 to 982 C within the experimental error of the measurements, except for two minimums near 9 and 12.2 μ.

3571 Studies in Properties of Capillary-Held Liquids. III. Boiling Points of Liquids Adsorbed on Porous Solids. IV. Isosteric Heats of Adsorption. Balwant Rai Puri, Som Naht Khanna, and Y. P. Myer. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 452-458.

Determination of properties of chloroform, benzene, dioxane, acetone, and ethyl alcohol on silica gel, alumina gel, and bentonite.

3572 Solubility of Carbon in Sodium at Elevated Temperatures. J. G. Gratton. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1807, June 1957, 18 p. (UF767 Un3.1ka Contin.)

Solubility varied from 32 to 74 p.p.m. in the temperature range 147 to 700 C.

3573* (German.) Discharge of the Solution From Emulsion Films. **Über das Ausfliessen der Lösung aus Schaumfilmen.** A. Scheludko. *Kolloid-Zeitschrift*, v. 155, no. 1, Nov. 1957, p. 39-44.

Theoretical and experimental examination of the spontaneous reduction of the thickness of horizontal emulsion films of Na-oleate, saponin, or isoamyl alcohol solutions. These films were formed at the thickened concave edges.

3574* (German.) Empirical Relationships Between the Flow Curves of High Molecular Solutions and the Properties of the Dissolved Molecules. **Empirische Zusammenhänge zwischen den Fliesskurven hochmolekularer Lösungen und den Eigenschaften der gelösten Moleküle. II-III.** J. Schurz. *Kolloid-Zeitschrift*, v. 155, no. 1, Nov. 1957, p. 45-64.

Interpretation of the flow curves and their effect on the concentration of carboxymethylcellulose. Effect of the particle weight, concentration, and temperature. Polydispersion curves as parallel to the differential curves of mass distribution. Application of the transportation theory of viscous flow and of structure mechanics.

3575* (Russian.) Investigation of Ion-Exchange Properties of Electrode Glasses by Means of Radioactive Indicators. **Issledovanie ionoobmennykh svoistv elektrodnykh stekol metodom radioaktivnykh indikatorov.** V. V. Moiseev and B. P. Nikol'skii. *Leningradskogo, Universiteta, Vestnik, Seriia Fiziki i Khimii*, v. 12, no. 16, 1957, p. 69-84.

Study of the interaction of electrode glasses with metal function in aqueous solutions of electrolytes by means of radioactive isotopes, and a comparison of electrochemical and ion-exchange properties of these glasses.

3576* (Russian.) The Influence of Anions of Membranogenes on Structural and Electrokinetic Properties of Precipitated Copper. Ferrocyanide Membranes. **Vliianie anionov membranogenov na strukturnye i elektrokineticheskie svoistva osadochnykh membran iz ferrotsianida medi.** I. F. Karpova and A. N. Dolzhenkova. *Leningradskogo, Universiteta, Vestnik, Seriia Fiziki i Khimii*, v. 12, no. 16, 1957, p. 117-126.

Preparation of semipermeable, precipitated membranes from copper ferrocyanide on collodion supports using the solutions $K_4Fe(CN)_6$ and those of the copper salts: $Cu(NO_3)_2$, $CuSO_4$, $Cu(C_2H_3O_2)_2$ and $CuCl_2$. Effect of anion composition of the solution in which the formation of the membrane takes place on the electrokinetic properties of the membrane (ion transport and surface conductivity).

3577 The Exchange Reaction Between Substituted Benzyl Iodides and Potassium Iodide. VIII. *p*-Methylbenzyl Iodide. IX. *p*-Carbomethoxybenzyl Iodide. Milton Kahn and J. L. Riebsomer. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2075UNM, Nov. 1957, 20 p. (UF767 U3La Contin.)

Determination of rate laws.

3578* Absorption Spectra of the Complexes of Uranium (VI) With Some β-Diketones. H. I. Feinstein. *Microchemical Journal*, v. 1, no. 2, 1957, p. 237-244.

Four β-diketones were studied for sensitivity to uranium(VI). The molar absorptivity under optimum conditions varied from 20,600 for 2-thenoyltrifluoroacetone to 31,200 for 2-furoyltrifluoroacetone.

3579 The Molecular Theory of Solutions. I. Prigogine. 448 p. 1957. Interscience Publishers, Inc., New York. (QD541 P93m)

Considers the thermodynamic properties of important classes of mixtures in terms of the properties of the pure components.

3580 Thermal Conductivity of Liquid Helium II in Very Narrow Channels. K. R. Atkins. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 911-913.

In channels of width 10^{-5} cm. or less the dominating factor is the viscosity of the normal component. Near 1 K, however, the phonon mean free path becomes comparable with the channel width and the phonons therefore pass more readily through the channel.

3581 Magnetic Analysis of the Uranium-Oxygen System. Anthony Arrott and J. E. Goldman. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 948-953.

Data make it possible to define clearly the phase limits of the UO_2 and U_3O_8 structures and to determine unambiguously that the excess O ions in the nonstoichiometric salts occupy interstitial positions in the lattice.

3582* (English.) **Structure of Nuclear Quadrupole Resonance Line. II. Solid Bromine.** Shoji Kojima, Yoshihito Abe, Midori Minematsu, Kineo Tsukada, and Akira Shimauchi. *Physical Society of Japan, Journal*, v. 12, Nov. 1957, p. 1225-1231.

Broad resonance lines of Br^{79} and Br^{81} in a single crystal of Br were studied. The observed derivative curves of the lines could not be resolved into more than three lines.

3583* (English.) **Paramagnetic Resonance in Copper Acetate Monohydrate.** Hidetaro Abe and Junji Shimada. *Physical Society of Japan, Journal*, v. 12, Nov. 1957, p. 1255-1258.

3584* (Polish.) Separation of Helium-Neon-Nitrogen Mixtures by the Combined Adsorption-Desorption Method. **Rozdzielanie mieszanin helowo-neonowo-azotowych metoda kombinowanej adsorpcji i desorpcji.** E. Zielinski. *Przemysł Chemiczny*, v. 13, no. 11, Nov. 1957, p. 642-646.

Results of determining the adsorption at low temperature of He, Ne, and N on the following absorbers: Carbopol H2, Carbopol Extra, Mercks' activated carbon, silica-gel, and alumina.

3585* Effects of Ionizing Radiation on Aqueous Media. N. Miller. *Reviews of Pure and Applied Chemistry*, v. 7, Sept. 1957, p. 123-154.

Chemical consequences of energy loss by charged particles; products of irradiation of water; experimental techniques; kinetics of radiation-induced reactions.

3586* Catalytic Exchange Between Deuterium and Saturated Hydrides. J. R. Anderson. *Reviews of Pure and Applied Chemistry*, v. 7, Sept. 1957, p. 165-194.

3587 The Kinetics of the Thermal Polymerization of Acetylene. C. G. Silcocks. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 411-429.

The thermal reactions of acetylene in Pyrex tubes at 352 to 472 C were studied by analysis of the amounts of acetylene and the simpler products at definite time intervals, supplemented by pressure measurements.

3588 Transport Processes Between Fluids and Clouds of Suspended Particles: Some Exact Solutions. D. B. Spalding. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 430-443.

Relates to processes such as the burning of pulverized solid fuel and of liquid fuel sprays, and absorption of a gas component by a solvent spray; takes account of convection and turbulent mixing of the cloud.

3589 The Thermal Properties of Alkali Halide Crystals. I. The Heat Capacity of Potassium Chloride, Potassium Bromide, Potassium Iodide and Sodium Iodide Between 2·8 and 270°K. W. T. Berg and J. A. Morrison. **II. Analysis of Experimental Results.** T. H. K. Barron, W. T. Berg, and J. A. Morrison. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 467-492.

3590 The Gaseous Oxidation of Aliphatic Alcohols. II. Ethyl Alcohol: the Products Formed in the Later Stages of Reaction. C. F. Cullis and E. J. Newitt. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 516-533.

Analytical studies of the reaction following the induction period.

3591* (English.) **Internal Rotation in 1,2-Dichloro-2-Methylpropane.** Michiro Hayashi, Isao Ichishima, Takehiko Shimanouchi, and San-Ichiro Mizushima. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 1-7.

Infra-red and Raman spectra were measured in the gaseous, liquid, and solid states and in various solutions. The normal vibrations of the skeleton of the molecule were calculated, using a potential function of the Urey-Bradley type. The observed infra-red and Raman frequencies were assigned

3592* (English.) **Normal Co-Ordinate Analysis of the Vibrational Spectrum of Iron Pentacarbonyl.** William G. Fateley and Ellis R. Lippincott. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 8-16.

3593* (English.) **Vibrational Band Intensity of the Hydroxyl Group in Phenols.** P. J. Stone and H. W. Thompson. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 17-20.

The effect of aromatic ring substituents upon the vibrational frequency, band intensity, and half-band width of the hydroxyl group in a number of phenols was measured.

3594* (English.) **Studies of the Band Near 3μ in Some Hydroxy Compounds.** M. St. C. Flett. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 21-37.

The hydroxyl absorption band of a number of compounds was measured in dilute CCl_4 solution, and attempts made to relate its wavelength, intensity, and shape to structural features of the molecule.

3595* (English.) **Infra-Red Absorption Bands Associated With the NH Group. III. Hydroxamic Acids and Derivatives.** D. Hadži and D. Prevoršek. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 38-51.

The hydroxamic acids $R{\cdot}C = O{\cdot}(NH{\cdot}OH)$ were investigated, in which R is H, CH_3, CH_2Cl, $CH_3(CH_2)_{10}$, $CH_3(CH_2)_{14}$, and C_6H_5, respectively.

3596* (English.) **The Molecular Structure of Niobium Pentachloride.** J. Gaunt and J. B. Ainscough. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 52-56 .

Infra-red and Raman spectra were measured and interpreted in a manner consistent with the rigid selection rules for the trigonal bipyramid structure. Thermodynamic properties were calculated on the simple harmonic oscillator approximation and were measured and interpreted.

3597* (English.) **The Molecular Structure of Antimony Pentafluoride.** J. Gaunt and J. B. Ainscough. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 57-60.

Infra-red and Raman spectra; thermodynamic properties.

3598* (German.) Organic Molecules in the Glow Discharge. **Organische Moleküle in der Glimmentladung. III.** Spectroscopic Tests on the Reaction of Benzene, Toluene, Chlorobenzene, Diphenyl and Benzene Chloride. **Spektroskopische Untersuchungen über das Verhalten von Benzol, Toluol, Chlorbenzol, Diphenyl und Benzylchlorid.** H. Schüler and E. Lutz. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 61-69 + 1 plate.

3599* (English.) **Infra-Red Spectroscopic Studies of Hydrogen Bonding in Methanol, Ethanol, and *t*-Butanol.** Urner Liddel and Edwin D. Becker. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 70-84.

The alcohols were studied in CCl_4 solution over a concentration range 0·005-1·0 M and a temperature range −15 to +60 C.

3600* (English.) **Characteristic Infra-Red Absorption Frequencies of Substituted Naphthalenes.** J. G. Hawkins, E. R. Ward, and D. H. Whiffen. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 105-109.

Frequencies are tabulated in relation to the substitution pattern of the separate rings. Tables include predominantly in-plane and out-of-plane C-H deformation frequencies.

3601* (French.) The Isotopic Analysis of Lithium by Optical Spectroscopy. **Analyse isotopique du lithium par spectroscopie optique. I.** Utilization of the Line $\lambda = 4603$ Å. **Utilisation de la raie $\lambda = 4603$ A.** J. Artaud, J. Blaise, and S. Gerstenkorn. *Spectrochimica Acta*, v. 10, no. 1, Nov. 1957, p. 110-118.

An interferometric isotopic assay for Li with the line $\lambda = 4603$ (2P-4D) is described. The light source is a liquid N-cooled hollow cathode working under low current. Excited in this way, the line $\lambda = 4603$ does not show any self absorption, unlike the red line $\lambda = 6707{\cdot}8$ Å.

3602* Correlation of Equilibrium Data for the System SO_2-H_2O-CaO. W. A. Dickens and A. W. Plummer. *Tappi*, v. 40, Nov. 1957, p. 895-899.

Data from a literature survey was statistically correlated by a modified Cox-Othmer method over a total SO_2 concentration range of 1.00 to 6.00 grams SO_2 per 100 grams H_2O and a combined SO_2 concentration range of 0.50 to 2.50 grams SO_2 per 100 grams H_2O.

3603 Vapor Pressure Tables for Liquid Uranium Hexafluoride. A. A. Brooks and P. Wood. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, K-722, (Adden. 1), Nov. 1957, 7 p. (UF767 Un3.1k Contin.)

3604* (Russian.) The Use of Combined Light Dispersion in the Study of Composition and Structure of a Substance. **Primenenie kombinatsionnogo rasseianiia sveta k issledovaniiu sostava i stroeniia veshchestva.** M. M. Sushchinskii and P. A. Bazhulin. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 2, Oct. 1957, p. 301-321.

3605* (Russian.) Study of the Hydrogen Bond by Spectroscopic Methods. **Issledovanie vodorodnoi sviazi spektroskopicheskimi metodami.** V. I. Malyshev. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 2, Oct. 1957, p. 323-353.

Studies of intramolecular reactions.

3606* (Russian.) Certain Problems in Molecular Light Dispersion of Liquids. **Nekotorye voprosy molekuliarnogo rasseianiia sveta v zhidkostiakh.** I. L. Fabelinskii. *Uspekhi Fizicheskikh Nauk*, v. 63, no. 2, Oct. 1957, p. 355-410.

Discusses thermodynamic and non-thermodynamic theories, intensity of the light dispersed on anisotropy fluctuations, spectral compositions, dispersion and the speed of hypersonic waves, correlation of the intensities of the dispersed light line in the fine structure components, and the width of this line.

3607* (German.) Chemical Transport Reactions. **Chemische Transportreaktionen. IV.** Transport of Silicon Dioxide to a Low Temperature Zone Under the Effect of Silicon Oxide and Silicon Halides. **Die Wanderung von Siliciumdioxyd im Temperaturgefälle unter Mitwirkung von Siliciummonoxyd und Siliciumhalogeniden.** Harald Schäfer and Bernhard Morcher. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 221-226.

When iodine is added to a certain amount of Si and SiO_2 in a closed flask, the SiO_2 moves from a high (1270 C) to a lower (1000 C) temperature zone. This phenomenon was investigated.

3608* (German.) Catalytic Properties of Iron and Binary Iron Systems. **Katalytische Eigenschaften von Eisen und binären Systemen des Eisens. II.** Reduction of $FePO_4$ to FeP and Its Catalytic Effect on Carbon Monoxide Decomposition. **Die Reduktion von $FePO_4$ zu FeP und dessen katalytische Wirksamkeit auf die Kohlenoxydspaltung.** P. Royen and J. Korinth. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 291, nos. 5-6, Oct. 1957, p. 227-238.

Reduction by means of CO. Detection of an intermediate stage in the process ($FePO_4 \rightarrow Fe_2P_2O_7 \rightarrow FeP$) by means of X-ray analysis.

3609* (English.) **Polytypism and Growth Mechanism in Zinc Sulphide.** V. G. Bhide. *Zeitschrift für Kristallographie*, v. 109, no. 2, Oct. 1957, p. 81-86.

Interlaced hexagonal growth spirals, observed on natural surfaces of ZnS crystals, in accordance with the dislocation theory, exhibit polytypism. The phenomena is discussed and a modification to Frank's theory is suggested.

3610* (German.) Effect of Chlorine Molecules on Emission of Negative Ions From Cesium Surfaces. **Die Emission negativer Ionen bei Einwirkung von Chlormolekülen auf Caesiumoberflächen.** K. Röhrdanz and K. Ulmer. *Zeitschrift für Physik*, v. 149, no. 4, 1957, p. 432-434.

Ions from a Cs layer deposited by evaporation in high vacuum are studied.

3611* (German.) The Effect of Organic Compounds on Chemical Oxidation From Fe^{2+} to Fe^{3+} by X-Rays. **Der Einfluss organischer Verbindungen auf die strahlenchemische Oxydation von Fe^{2+} zu Fe^{3+} durch Rontgenstrahlen.** S. Rosinger, R. Glocker, and J. Goubeau. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 1-2, Oct. 1957, p. 1-11.

A study of the chemical conversion by X-rays of Fe^{2+} to Fe^{3+} in the presence of hydrocarbons, primary alcohols, aldehydes, organic acids, and other compounds.

3612* (German.) Oxidation of Finely Divided Iron Powders at 30 C With Special Regard to the Specific Surface. **Die Oxydation von feinverteilten Eisenpulvern bei 30°C unter besonderer Berücksichtigung der spezifischen Oberfläche.** Helmut Hepp. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 1-2, Oct. 1957, p. 40-58.

A gravimetric process was developed for the examination of the chemical sorption phenomena under atmospheric pressure. Application to the study of the weight increase of finely divided carbonyl iron powder. The reaction obeyed a logarithmic time law.

3613* (German.) The Oxidation of Titanium Nitride. **Über die Oxydation des Titannitrids. I.** Kinetics of the Oxidation. **Die Kinetik der Oxydation.** A. Münster and G. Schlamp. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 1-2, Oct. 1957, p. 59-75.

Measurements of the oxidation rate of TiN in pure O between 625 and 1075 C.

3614* (German.) The Origin of Bands at 1700 cm^{-1} in the Infra-Red Spectra of Propargyl Compounds. **Über die Herkunft der Bande bei 1700 cm^{-1} in den Infrarotspektren von Propargylverbindungen.** B. Hampel. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 13, nos. 1-2, Oct. 1957, p. 123-125.

3615* (Russian.) Formation of Negative H^- Ions in Electron Collisions With Hydrogen Molecules. **Obrazovanie otritsatel'nykh ionov H^- pri stolknoveniiakh elektronov s molekulami vodoroda.** V. I. Khvostenko and V. M. Dukel'skii. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 33, no. 4, 1957, p. 851-855.

Studying the problem under conditions eliminating the parasitic effect of water vapors.

3616* (Russian.) Paramagnetic Relaxation in Single Crystals of Certain Salts of the Elements of the Iron Group. **Paramagnitnaia relaksatsiia v monokristallakh nekotorykh solei elementov gruppy zheleza.** T. M. Volokhova. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 33, no. 4, 1957, p. 856-860.

Measurements are made of the constant b/c (b is the constant of the magnetic thermal capacity, c is the Curie constant) and the time of spin-lattice relaxation p in single crystals of the following paramagnetic salts: $CuSO_4 \cdot 5H_2O$, $Cu(NH_4)_2(SO_4)_2 \cdot 6H_2O$, $CuK_2(SO_4)_2 \cdot 6H_2O$, $MnSO_4 \cdot 4H_2O$, $Mn(NH_4)_2(SO_4)_2 \cdot 6H_2O$, $Fe(NH_4)(SO_4)_2 \cdot 12H_2O$, and $CrK(SO_4)_2 \cdot 12H_2O$.

3617* (Russian.) On the Mechanism of Catalysis. **O mekhanizme kataliza. I.** N. I. Kobozev. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2162-2183.

The adsorption energy aspect of heterogeneous catalysis; hydrogenation catalysis. A two-stage process of adsorption and reaction; thermodynamics of adsorption. Homogeneous chain hydrogenation.

3618* (Russian.) The Velocity of Ultrasonics Propagation and the Hydration of Solutions. **Skorost' rasprostraneniia ul'trazvuka i gidratatsiia rastvorov.** E. F. Dubinina and B. B. Kudriavtsev. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2191-2199.

Application of acoustic measurements to the study of solutions; determination of hydration. Evaluation and correction of the compressibility of the hydrate layer and the hydrated ion. Sensitiveness of the adiabatic compressibility.

3619* (Russian.) The Thermodynamics of Rare Metals. **Termodinamika redkikh metallov. VII.** The Equilibrium of Nickel Tungstates With Hydrogen. **Ravnovesie vol'framata nikelia s vodorodom.** T. N. Rezukhina, G. M. Dugacheva, and Iu. P. Simanov. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2206-2212.

The equilibrium constants in the three-stage reduction of $NiWO_4$ by H were measured for four temperatures between 806 and 990 C; Ni_4W and W were the final products.

3620* (Russian.) Separation of Stable Nitrogen Isotopes by Chemical Exchange. **Razdelenie stabil'nykh izotopov azota metodom khimicheskogo obmena. II.** G. M. Panchenkov, I. A. Semiokhin, and O. P. Kalashnikov. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2224-2228.

Study of the influence of rate of flow and the temperature on the separation of N isotopes effected in a counter flow column between $N^{15}H_3$ and $N^{14}H_4NO_3$.

3621* (Russian.) The Heat Capacities of Lead and Cadmium Tungstates at High Temperatures. **Teploemkosti vol'framatov svintsa i kadmiia pri vysokikh temperaturakh.** L. A. Zharkova and T. N. Rezukhina. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2278-2280.

The mean heat capacities of Pb and Cd tungstates were measured over a range of temperatures by means of a massive calorimeter. Equations are given for calculating mean and true heat capacities.

3622* (Russian.) A Sensitive Method for Determining Diffusion Coefficients. **Chuvstvitel'nyi metod izmereniia koeffitsientov diffuzii.** V. A. Geodakian and A. A. Zhukhovitskii. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2295-2301.

Measuring small diffusion coefficients by use of radioactive isotopes, based on measuring the surface concentration by making "prints" through anodic dissolution.

See also: **4232** (adsorption and diffusion of H on Ni); **4269** (surface properties of Ni powder); **4309** (radiochemical development in USSR); **4530** (ion exchange resins).

COATINGS

3623* (French.) Paint Drying by Convection or Radiation From the Technical and Economical Point of View. **Aspects du séchage des peintures par convection et rayonnement des points de vue technique et économique.** Léo Walter. *Chaleur & Industrie*, v. 38, no. 388, Nov. 1957, p. 288-296.

Using hot air currents or invisible heat radiation. Critical temperature of the coating. Time spent to obtain dryness. Water content of the coating. Thermal and total yields. Factors limiting the drying speed in the radiation method.

3624* (French.) Reflecting Power With Normal Incidence From the Visible to the Far Ultra-Violet of Germanium Depositions Obtained by Evaporation Under Vacuum. **Le pouvoir réflecteur en incidence normale depuis le visible jusque dans l'ultraviolet lointain des dépôts de germanium obtenus par évaporation sous vide.** Sonja Kandare. *Comptes Rendus*, v. 245, no. 20, Nov. 13, 1957, p. 1716-1718.

The reflecting power was studied in a spectral range between 1100 and 5000 Å. Variation according to the conditions of evaporation and increase of the same power when a Ta evaporator is used.

3625 Structure, Characteristics and Uses of Urethane Coatings. Richard C. Burck. *Corrosion*, v. 13, Dec. 1957, p. 130 + 2 pages.

Molecular configuration of the isocyanate polymers is given, together with a brief explanation of the linkages which give the coatings and materials derived from them their properties.

3626 An Investigation of Explosion Reliefs for Industrial Drying Ovens. II. Back Reliefs in Box Ovens: Reliefs in Conveyor Ovens. P. A. Cubbage and W. A. Simmonds. *Gas Council, Research Communication* GC43, Nov. 1957, 41 p. (TP700 G21.2r Vis.)

The most suitable position for a relief in a paint-drying oven is at the back, occupying the whole, or nearly the whole, area of the back.

3627* (German.) Investigations on the Phenomena Occurring During the Vitreous Enameling of Cast Iron. **Untersuchungen über Vorgänge bei der Gussemaillierung.** D. Kamran. *Giesserei*, v. 44, no. 24, Nov. 21, 1957, p. 705-713.

Structure of the scale. Oxidation rate of cast iron in different gases. Comparision of the surface roughness of shot-blasted castings and shot-blasted plate. Effect of elements added on the casting to be enamelled. Effect of superheating melted cast iron, wall thickness, and of repeated remelting. Adhesive power of the enamel on spheroidal and on white cast irons.

3628 Finishes for Wood. Albert J. Kirsch. *Materials in Design Engineering*, v. 46, Dec. 1957, p. 114-119.

Six types of clear, opaque, and laminated finishes that can be used on wood products are summarized.

3629 Metal Spraying—Development and Application. S. J. Oechsle, Jr. *Metal Finishing*, v. 55, Dec. 1957, p. 67 + 5 pages.

Uses for metalizing; sprayed powder coatings; surface preparation.

3630* The Application of Vitreous Enamel by the Electrostatic Process. S. Hallsworth. *Metal Finishing Journal*, v. 3, Nov. 1957, p. 449 + 4 pages.

Development of the process; enamel and milling; equipment.

3631* (French.) The Use of Flux in Galvanizing. **L'emploi des flux en galvanisation.** A. Herz. *Métallurgie et la Construction Mécanique*, v. 89, no. 11, Nov. 1957, p. 955 + 1 page.

Various spelters and their properties. Hachmeister's equilibrium diagram. Loss of zinc. Fluxing with double salts. Cover fluxing.

3632 Factors Affecting Plastisol Flow. H. E. Frey. *Modern Plastics*, v. 35, Dec. 1957, p. 164 + 4 pages.

Effects of resin, plasticizers, pigments, and fillers.

3633* Use of Hexylene Glycol and Other Solvents in Styrene-Butadiene Latex Paint. Roy W. Tess and Robert D. Schmitz. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, Dec. 1957, p. 1346-1369.

Hexylene glycol considerably improved leveling when used at 20% based on vehicle content. Its use permits the formulation of paint containing high PVC.

3634* Solvent-Free Epoxy Amine Systems. G. H. Ott. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, Dec. 1957, p. 1370-1403.

Recent investigations and formulation developments in adding N-containing compounds to amino-polyamides in epoxy-polyamide systems. Influence of polyamines, containing different types of amino groups, on various properties of solvent-free systems. Formulations for various applications.

3635 The Role of Peroxidic Catalysts in Coating Compositions. C. E. H. Bawn. *Oil & Colour Chemists' Association, Journal*, v. 40, Dec. 1957, p. 1027-1034.

Formation and reactions of organic hydroperoxides; copolymer resins; catalyzed decomposition of peroxides.

3636 Metal-Drier Catalysis. C. T. Morley-Smith. *Oil & Colour Chemists' Association, Journal*, v. 40, Dec. 1957, p. 1035-1050.

Mechanism of drier action; variants in available metal-soap drying catalysts and their significance; new developments in driers.

3637 Melamine and Guanamine Resins in Surface-Coatings. F. P. Grimshaw. *Oil & Colour Chemists' Association, Journal*, v. 40, Dec. 1957, p. 1060-1073.

Production and properties of melamine and guanamines and surface-coating resins based on these compounds. Effect of varying melamine/formaldehyde ratio and degree of butylation on the properties of butylated resins and resin/alkyd finishes.

3638* Studies on Electroless Nickel Plating. Clara H. de Minjer and Abner Brenner. *Plating*, v. 44, Dec. 1957, p. 1297-1305.

Rate of deposition increased with pH of the bath, and varied with the nature of the acid used for buffering and/or complexing of Ni ions. Hydroxyacetic and lactic acids yielded highest rate of deposition.

3639 Vacuum Coatings Go Industrial. Philip J. Clough. *Product Engineering*, v. 28, Dec. 23, 1957, p. 67-69.

Base materials; coating properties; limitations; cost considerations.

3640 A Survey of Paint Application Methods. V. Roller Coating; Tumble and Centrifugal Painting; Silk Screening; Aerosol Painting. Ezra A. Blount. *Products Finishing*, v. 22, Dec. 1957, p. 24-34.

3641* (Polish.) Producing Protective Coatings on Zinc and Zinc Alloys. **Wytwarzanie powłok ochronnych na cynku i jego stopach.** Tadeusz Welkens. *Przeglad Odlewnictwa*, v. 12, no. 10, Oct. 1957, p. 287-289.

Results desired in protective coatings for castings. Surface preparation with CH_2Cl_2, $CHCl_3$, or CCl_4. Non-metallic coatings with Cr or P; painting; nickel-plating.

3642* (German.) The Use of the Oxy-Acetylene Process for Hard Surfacing Parts Subjected to Wear, With Particular Reference to Lathe Tools. **Autogenes Panzern von Verschleissteilen unter besonderer Berücksichtigung von Drehwerkzeugen.** Grix, Siebel, and Fleck. *Schweissen und Schneiden*, v. 9, no. 11, Nov. 1957, p. 473 + 9 pages.

Application of hard surfacing, life of hard surfaced lathe tools and forged high-speed-steel tools. Economic considerations.

3643* (German.) The Manufacture of Sheet-Metal Ground Coats Free From Boron, Using Heavy Spar as a Substitute for Boron. **Über die Herstellung von borfreien Blechgrundemails mit Schwerspat als Boraustauschstoff.** Armin Petzold and Helmut Betzer. *Silikattechnik*, v. 8, no. 10, Oct. 1957, p. 434-436.

For certain applications only ground coats free from boron are allowed. Describes the manufacture of ground coats using barium sulfate as a reducing agent.

3644* (German.) Single-Coat White Enamel Applied Directly on Steel. **Einschicht-Weissemails direkt auf Stahl. V.** The Fitness of White Finishing Enamel for Direct Application on Enamel Sheet Steel. **Über die Eignung von Weissen Deckemails für den Direktauftrag auf Emaillierstahlblech.** Armin Petzold and Helmut Betzer. *Sprechsaal*, v. 90, no. 21, 1957, p. 499-502.

Discusses the problem of using titania single-coat enamels. Covering capacity, expansion characteristics, and firing behavior are analyzed.

3645* (Swedish.) Some Recent Synthetic Fixing Agents for Varnish. **Några nyare helsyntetiska lackbindemedel.** Paul Nylén. *Svensk Kemisk Tidskrift*, v. 69, no. 9, 1957, p. 417-439.

Historical survey of linseed oil, oil varnish, latex paints, and carbamide resins. Hardening of expoxy resins with polyamines at room temperature. Properties of polyepoxides, polyurethanes, silicone oils and resins, and esters from Ti.

See also: **3355** (detection of oiticica oil); **3937** (pigment particle size measurement); **4017** (corrosion of imperfect coatings); **4145** (reflectance of evaporated Al); **4543** (polyvinyl chloride coatings).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

3646* (French.) Servomechanisms in Analog Computers. **Les servomécanismes dans les calculateurs analogiques. II.** R. Gendreu. *Annales de Radioélectricité*, v. 12, no. 50, Oct. 1957, p. 363-381.

A study of the applications of a servomechanism in a H. F. computer. Results were applied to determine the performance in the case of differentiation and integration. Study of an anti-aircraft gunnery problem.

3647* Informative Feedback in Jet-Pilot Control-Stick Motion. N. D. Diamantides. *Applications and Industry*, 1957, no. 33, Nov., p. 243-249.

An airplane simulator designed for pilot control-efficiency evaluations makes possible the observation of a highly interesting feedback phenomenon in pilot control-stick hand action.

3648* The Role of Analog Computers in Propeller Control Design. Roy K. Frick. *Applications and Industry*, 1957, no. 33, Nov., p. 257-263.

3649* An Analytic Method for Finding the Closed-Loop Frequency Response of Nonlinear Feedback-Control Systems. Katsuhiko Ogata. *Applications and Industry*, 1957, no. 33, Nov., p. 277-285.

3650* For Plus Advantages Specify Numerical Control. Glenn R. Petersen. *Automation*, v. 4, Dec. 1957, p. 50-55.

Application of numerical positioning and contouring control to machining operations. Advantages.

3651* Computer Control Closes the Loop. Gilbert C. Close. *Automation*, v. 4, Dec. 1957, p. 57-60.

Introduction of digital computers into the control loop of continuous and batch processes promises attainment of degrees of automation and process optimization impossible by manual control.

3652* Hydraulic Control of Automatic Machinery—Synthesis of Systems. III. Automatic Acting and External Control Hydraulic Valves. R. Hadekel. *Automation*, v. 4, Dec. 1957, p. 74-82.

Functioning, construction, and some practical applications.

3653 A New Storage Element Suitable for Large-Sized Memory Arrays—The Twistor. Andrew H. Bobeck. *Bell System Technical Journal*, v. 36, Nov. 1957, p. 1319-1340.

Three methods were developed for storing information in a coincident-current manner on magnetic wire. The resulting memory cells have been collectively named the "twistor". Two of these methods utilize the strain sensitivity of magnetic materials and are related to the century-old Wertheim or Wiedemann effects; the third utilizes the favorable geometry of a wire.

3654 A Network Containing a Periodically Operated Switch Solved by Successive Approximations. C. A. Desoer. *Bell System Technical Journal*, v. 36, Nov. 1957, p. 1403-1428.

3655* Ferroresonant Circuits for Digital Computers. C. B. Newport and D. A. Bell. *British Institution of Radio Engineers, Journal*, v. 17, Nov. 1957, p. 619-630.

Circuit characteristics are analyzed, and conditions for bistability obtained. Practical circuits are presented for a shift register, three-stage binary counter, and two-input logical adder.

3656 Magnetic Output Amplifiers for Digital Control. Andress Kernick and H. A. Perkins, Jr. *Communication and Electronics*, 1957, Nov., p. 504-508.

Voltage regulation, response, and control problems are reviewed for magnetic amplifiers operating loads whose range in current requirements may be as great as 20 to 1 with applicable specifications narrowing output-voltage variation to an allowable 0 to −5%.

3657 Operational Magnetic Amplifiers With Multiple Control Windings. T. T. Kadota and H. C. Bourne. *Communication and Electronics*, 1957, Nov., p. 515-520.

3658 Cycle- and Delay-Time Considerations in a Real-Time Digital Computer. Herbert Freeman. *Communication and Electronics*, 1957, Nov., p. 588-593.

3659 Six Control Problems Solved by Magnetic Amplifiers. A. E. Maine. *Control Engineering*, v. 4, Dec. 1957, p. 80-86.

Use of magnetic amplifiers in problems ranging from temperature control through aircraft propeller synchronization.

3660 Magnetic Core Event Counter for Earth Satellite Memory. D. H. Schaefer. *Electrical Engineering*, v. 77, Jan. 1958, p. 52-56.

Micrometeorite bombardment of artificial earth satellites can be recorded through the use of counters. Counter circuitry being developed to record this data is described.

3661 Principles of Very Low Power Electrochemical Control Devices. Ray M. Hurd and R. N. Lane. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 727-730.

An electrochemical detector for acoustic energy operates on 10μw in the quiescent state, delivering 300-500μw when fully excited.

3662* Designing FM Systems With an Analog Computer. Henry A. Musk. *Electronic Design*, v. 5, Dec. 1, 1957, p. 40-43.

A specially-constructed analog computer was used to analyze synchronously tuned antenna networks for transmitter F.M.

3663 A Simple Shaft Digitizer and Store. A. Tiffany. *Electronic Engineering*, v. 29, Dec. 1957, p. 568-574.

Use of Shaft Position encoders to derive digital data from analog instruments. Apparatus used in a punched card data accumulating system.

3664 A Wide Band Analogue Multiplier Using Crystal Diodes and Its Application to the Study of a Non-Linear Differential Equation. Michael E. Fisher. *Electronic Engineering*, v. 29, Dec. 1957, p. 580-585.

3665 Digital-Analog Converter Provides Storage. H. N. Putschi, J. A. Raper, and J. J. Suran. *Electronics*, v. 30, Dec. 1, 1957, p. 148-151.

When high-speed or environment rule out mechanical converters, purely electronic units must be employed. This transistorized converter changes eight binary bits, received in parallel from a shift register, to 128 steps in amplitude of a 400 c.p.s. sine wave. One binary bit is used to obtain phase information.

3666 Puncher Transcribes Computer Output. James E. Palmer, James J. O'Donnell, and Charles H. Propster, Jr. *Electronics*, v. 30, Dec. 1, 1957, p. 164-167.

Transistor circuits consisting of two-input resistor gates, flip-flops, and other delay circuits are combined in plug-in assemblies to provide logical and driving operations for card puncher that produces business machine cards at the rate of 150 a min. Each card is checked by reading completed card and comparing its output with original input.

3667 The Minimality of Rectifier Nets With Multiple Outputs Incompletely Specified. Robert McNaughton and Bernon Mitchell. *Franklin Institute, Journal*, v. 264, Dec. 1957, p. 457-480.

Solution to the problem of finding a minimal rectifier net for use in a computer.

3668 Analog or Digital Computer for Process Control? T. M. Stout. *Institute of Radio Engineers, Transactions on Automatic Control*, PGAC-3, Nov. 1957, p. 3-7. (TK1 In6.6ac Vis.)

Analog computers are fast, simple, and inexpensive for relatively small control jobs, while digital computers have accuracy, versatility, and flexibility which adapt them to more complex jobs.

3669 Analysis of a Nonlinear Control System for Stabilizing a Missile. Leonard Atran. *Institute of Radio Engineers, Transactions on Automatic Control*, PGAC-3, Nov. 1957, p. 8-12. (TK1 In6.6ac Vis.)

An autopilot with attitude and rate feedback, representative system lags, and a two-way relay servo with inherent hysteresis

is considered for roll control of a missile with peripheral, tangentially operating jets.

3670 Root Locus Method of Pulse Transfer Function for Sampled-Data Control Systems. Masahiro Mori. *Institute of Radio Engineers, Transactions on Automatic Control,* PGAC-3, Nov. 1957, p. 13-20. (TK1 In6.6ac Vis.)

3671 Statistical Design and Analysis of Multiply-Instrumented Control Systems. Robert M. Stewart. *Institute of Radio Engineers, Transactions on Automatic Control,* PGAC-3, Nov. 1957, p. 29-31. (TK1 In6.6ac Vis.)

Application of Wiener's linear least-square filter theory.

3672 Multicolor Storage Tube. C. D. Beintema, S. T. Smith, and L. L. Vant-Hull. *Institute of Radio Engineers, Transactions on Electron Devices,* v. ED-4, Oct. 1957, p. 303-309. (TK1 In6.6ed Vis.)

Tubes for applications with low frame rates have been built by modification of direct-viewing storage tubes. A perforated shadow mask is placed between the three writing guns and the storage surface. This shadow mask allows electrons from each writing gun to strike discrete storage areas, each containing a single aperture in register with a color dot on the view plate.

3673 Detection of Fluctuating Pulsed Signals in the Presence of Noise. Peter Swerling. *Institute of Radio Engineers, Transactions on Information Theory,* v. IT-3, Sept. 1957, p. 175-178. (TK1 In6.6it Vis.)

System consists of a predetection stage, square law envelope detector, and linear postdetection integrator.

3674 On the Role of Dynamic Programming in Statistical Communication Theory. R. Bellman and R. Kalaba. *Institute of Radio Engineers, Transactions on Information Theory,* v. IT-3, Sept. 1957, p. 197-203. (TK1 In6.6it Vis.)

3675* General Applications of Digital Computers. Andrew D. Booth. *Institution of Electrical Engineers, Journal,* v. 3, no. 36, Dec. 1957, p. 629-636.

Description of basic principles and the logical programs that can be designed to meet problems such as mathematical solutions, systems refinements, and language translations.

3676 New Data-Handling System Uses a Digital Potentiometer. Saul Meyer and Marvin Blynn. *Instruments and Automation,* v. 30, Dec. 1957, p. 2270-2272.

This pinboard-programmed digital potentiometer scans many process variables, digitizes the data, and provides digital measurements accurate to 0.1% at a rate of one reading per sec.

3677* The Computer-Team Approach to Control-System Design. Ralph L. Moore. *ISA Journal,* v. 4, Dec. 1957, p. 548-553.

Case history shows how the steady-state and dynamic performance of a proposed process control system was determined by simulation on an analog computer.

3678 The Time Behaviour of Logarithmic Amplifier Input Circuits. T. P. Flanagan. *Journal of Scientific Instruments,* v. 34, Nov. 1957, p. 450-452.

Three definitions of effective time constant are examined, based on an analysis of the time behavior of the input circuit to a step change of input current.

3679 A Management Guide to Electronic Computers. William D. Bell. 403 p. 1957. McGraw-Hill, New York. (HF5548 B41m)

A nontechnical explanation of what an electronic computer is, what it will do, and its uses in a business. Actual case histories are included.

3680* (German.) Some Uses for Weak-Conductor Diodes and Transistors in Control Technology. **Einige Anwendungen von Halbleiterdioden und Transistoren in der Regelungstechnik.** A. Haidekker. *Regelungstechnik,* v. 5, no. 10, 1957, p. 342-345.

The transistor as an electronic switch in controlled mains-operated appliances, circuit breaker switches, control amplifiers, as a part of control loops, and as a component in digital measuring and control systems.

3681* Digital Codes in Data-Processing Systems. M. P. Atkinson. *Society of Instrument Technology, Transactions,* v. 9, Dec. 1957, p. 124-130.

Methods of designing such codes, also error-detecting and error-correcting codes.

3682* The Dollars and Sense of Numerical Control for Your Plant—Large or Small. G. MacF. Tuttle. *Tooling and Production,* v. 23, Dec. 1957, p. 89-101.

3683 A Further Study of Information Transmission With Matrix Patterns. E. T. Klemmer. *U. S. Air Force, Cambridge Research Center,* AFCRC-TN-57-1, Sept. 1957, 6 p. (TK7800 Un3.12c Contin.)

Eleven subjects were shown dot patterns on a 4 by 5 matrix for a tachistoscopic exposure of .03 sec. Complete responses made by the subjects showed a range in median number of cells correct of 16.1 to 18.8 out of a possible 20. Lower-bound information transmission scores varied from 4.4 to 10.4 bits.

3684 A Thermocouple Subcarrier Oscillator for Telemetering Temperatures From Pilotless Aircraft. Clifford L. Fricke. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4128, Dec. 1957, 50 p. (TL570 Un3t)

Design uses a diode-bridge modulator in conjunction with a phase-shift oscillator; the thermocouple voltage is changed to a.c. and is used to shift the phase and hence to change the frequency of oscillation.

See also: **3927** (technical journals and meetings in the automation fields); **3953** (process control equipment); **3983** (use of digital computers in design calculations); **4181** (numerical control of machine tools); **4435** (role of industrial engineer in systems design); **4607** (resistance welding of electrical controls).

ELECTRICAL ENGINEERING

3685 Tansmission Towers. Edmund E. Wilkins. *American Iron and Steel Institute, Preprint,* 1957, 29 p. (TS300 Am35ta Vis.)

Focuses on the importance of power transmission towers and problems peculiar to their manufacture.

3686 Galvanometer Resistance and Linearity. Bernard L. Miller. *American Journal of Physics,* v. 25, Dec. 1957, p. 617-623.

The values of galvanometer resistance obtained by the two half-deflection methods (constant-voltage vs. constant-current sources) often differ because of non-linearity in the galvanometer response. The correct value is the geometric means of the results of the two methods, if the initial deflections are the same in the two cases.

3687 (French.) Electric Current and Quantum Mechanics. **Le courant électrique et la mécanique quantique.** Georges Pocholle. *Annales des Télécommunications,* v. 12, Sept. 1957, p. 290-298.

Planck's and Joule's laws. Exchange of electric energy by means of quanta. The quantum theory of superconductivity. Electromagnetic energy and quanta. Nature and expression of the Joule effect. The quantum variation of the entropy of a non-continuous system.

3688* Design of Generating Equipment for Electra Turboprop Aircraft. J. R. M. Alger, W. O. Hansen, W. E. Warden, and L. Klein. *Applications and Industry* 1957, no. 33, Nov., p. 320-332.

3689* Dipoles and Electric Breakdown. J. A. Kok and M. M. G. Corbey. *Applied Scientific Research,* v. 6, sec. B, no. 6, 1957, p. 449-455.

Induced as well as permanent dipoles may gather at a place of maximum stress and form a bridge. Bridges consisting of permanent dipoles may cause the gap between the valence and conduction energy bands to be filled by impurity or imperfection levels. Low ionization potentials of electrons attached to permanent dipoles may facilitate breakdown.

3690 Design, Performance and Application of the Vernier Resolver. G. Kronacher. *Bell System Technical Journal*, v. 36, Nov. 1957, p. 1487-1500.

Precision angle transducers of orders 26, 27, 32, and 33 were designed, built, and tested. Construction of the unit is very simple because all windings are located on the stator. The absence of brushes and slip rings makes the unit inexpensive in production and reliable in performance.

3691 Arc Motion With Magnetized Electrodes. A. E. Guile, T. J. Lewis, and S. F. Mehta. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 444-448.

The velocities of d.c. arcs moving in air at atmospheric pressure between horizontal and parallel cylindrical electrodes were measured.

3692 Two-Phase Motor Drive Using Static Frequency-Doubler Amplifiers. G. W. Dick, P. P. Biringer, and G. R. Slemon. *Communication and Electronics*, 1957, Nov., p. 497-504.

A variable-speed drive in which a two-phase induction motor is energized by power modulators of the frequency-doubler type provides continuous and reversible control of motor torque.

3693 Design of an Improved 2-Stator Watt-Hour Meter. D. M. Smith. *Communication and Electronics*, 1957, Nov., p. 537-540.

3694 Equations for the Inductances and Current Distribution of Multiple-Conductor Single-Phase and Polyphase Busses. T. H. Chin and Thomas J. Higgins. *Communication and Electronics*, 1957, Nov., p. 553-558.

3695 A Self-Balancing Transformer-Core-Loss Bridge. A. H. Foley. *Communication and Electronics*, 1957, Nov., p. 567-573.

Direct readings, high precision, and high output torque make the self-balancing bridge particularly suitable for automation.

3696 Silicon Rectifiers in Brushless Machinery. H. W. Henkels, H. R. Camp, J. R. Fortier, W. J. Shilling, and R. E. Smith. *Communication and Electronics*, 1957, Nov., p. 620-626.

Application to generators for the B-58 bomber. Evolution of both oil-cooled and air-cooled rotating rectifier assemblies.

3697 Toroid Measures Spot Weld Current. Paton M. Zimmerman. *Electronics*, v. 30, Dec. 1, 1957, p. 132-133.

Voltage developed by toroidial pickup coil around welding electrode is converted to steady-state meter reading by a-c vtvm circuit. Accuracy is within 3% of full-scale meter deflection for weld times of 3 to 30 cycles.

3698* (Czech.) Discharges in Condenser Insulation. **Lonizácia v izolácii s kondenzátorovými vložkami.** Ján Artbauer. *Elektrotechnický Obzor*, v. 46, no. 11, Nov. 1957, p. 564-572.

Quantitative conditions of the ionization (internal discharges) in a condenser-type insulation, characterized by a great inhomogenity of the electric field at the edges of the conducting foils (coatings), which form the electrodes of wound condensers and are used for equalizing the electric field in condenser bushings and cable sealing ends.

3699* (Czech.) Cables for D. C. Transmission. **Káble pre jednosmerný prenos.** Michal Rapoš. *Elektrotechnický Obzor*, v. 46, no. 11, Nov. 1957, p. 589-596.

A summary of literature references concerning cables for electric power transmission at a very high d.c. voltage. A survey of experience in the development and testing of these cables.

3700* (German.) Short-Circuit Protection and Selectivity. **Kurzschlussschutz und Selektivität.** Theo Schmelcher. *ETZ, Elektrotechnische Zeitschrift*, v. 9, Ausgabe B, no. 11, Nov. 1957, p. 426-431.

In low-voltage installations, protection switches and safety fuses take care of short-circuit and selective protection. In the range of short-circuit currents, the family of curves must include the discharge-time characteristics.

3701* The Localisation of the Discharge Channel in a Glow Discharge. V. T. Chiplonkar, J. Mangaly, and Kumari D. V. Nagamani. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Oct. 1957, p. 272-276 + 5 plates.

Results obtained for discharge in air at voltages varying from 1·18 to 9·8 kv., discharge current 1·0 m.a., in a discharge tube of 3·5 cm. diameter.

3702 Influence of External Treatments on Electret Behavior. Jack W. Wild and J. D. Stranathan. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1055-1059.

When the surface of an electret which exhibited a homocharge was planed in a lathe, the sign of the equivalent surface charge changed to that of the heterocharge.

3703 Formulas for Applying Induction Motors on Rapid-Reversing Duty Cycles. Paul J. Dobbins. *Machine Design*, v. 29, Dec. 26, 1957, p. 81-84.

Rotor power during deceleration; stator loss during acceleration; plugging; power loss; motor temperature rise.

3704 Selecting Materials for Environmental Testing Equipment. Curtis Morling and John Bellinger. *Materials in Design Engineering*, v. 46, Dec. 1957, p. 124-126.

Tests for electrical components. How to be sure that the testing equipment itself withstands the environment without affecting the test results.

3705* (German.) The "Duroplast" Capacitor. **Der Duroplast-Kondensator.** R. Bretschneider. *Nachrichtentechnik*, v. 7, no. 10, Oct. 1957, p. 460-465.

Description of new small-size capacitors. Reduction of structural elements and better climatic adaptation are chief advantages.

3706 Quantum Theory of Electrical Transport Phenomena. W. Kohn and J. M. Luttinger. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 590-611.

3707 Theory of Superconductivity. J. Bardeen, L. N. Cooper, and J. R. Schrieffer. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1175-1204.

Theory is based on the fact that the interaction between electrons resulting from virtual exchange of phonons is attractive when the energy difference between the electrons states involved is less than the phonon energy.

See also: **3231** (dielectric properties of aluminum phosphate glass); **3719** (motor generators for electroplating); **3819** (power system reliability); **3960** (vibrations in generators foundations); **4006** (properties of electrical sheet); **4496** (thermoelectric power of ionic crystals).

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3708 A Study of Mechanical-Electrolytic Polishing on Uranium Metallographic Specimens. Floyd L. Brown. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5752, Jan. 1957, 19 p. (UF767 Un3.1an Contin.)

Shows that an efficient and effective procedure for preparation of saw cut U is the removal of about three-fourths of the cold worked layer with grade no. 2 paper, followed by grades 3/0 and 4/0. The remaining layer of metal was removed by prolonged electropolishing.

3709* (Russian.) Exchange Current Between Liquid Metal and Slag. **Tok obmena mezhdu zhidkim metallom i shlakom.** Iu. P. Nikitin and O. A. Esin. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 63-65.

Capacitance of the double layer of the metal-slag boundary and reaction resistance realized in a frequency range from 50 to 1700 c.p.s.

3710* (Russian.) Anodic Polarizability in Neutral Electrolytes of Alloys of Al With Alkali Earth Elements. **Anodnaia poliarizuemost' v neitral'nykh elektrolitakh splavov Al so shchelochno-zemel'nymi elementami.** A. L. Seifer. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 120-122 + 1 plate.

Determination of anodic polarization of alloys of Al with Ca, Sr, and Ba.

3711 Anodization of Lead and Lead Alloys in Sulfuric Acid. Jeanne Burbank. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 693-701.

The metals were shown to be perferentially attacked at grain boundaries and in interdendritic areas depending on the nature of the segregated material and structural discontinuities.

3712 Electrolytic Extraction of Thorium From Fused Salts. Lothar Abraham, Edward L. Thellmann, and James L. Wyatt. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 724-726.

High purity Th metal powder was produced by fused salt electrolysis of $ThCl_4$.

3713* Electro-Deposition and Dissolution of Zinc in Zincate Solutions. Indra Sanghi and W. F. K. Wynne-Jones. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Oct. 1957, p. 309-321 + 1 plate.

Smooth, even, and adherent deposition of Zn is difficult to obtain from pure zincate solutions. Improvement can be effected by the addition of traces of lead acetate to the electrolyte, and this improvement is most marked at 10-20mA/cm.^{2} current densities.

3714* (Spanish.) Internal Tension Measurement in Electrolytic Depositions of Metals. **Medida de las tensiones internas en los depositos electroliticos de metales.** Francisco Muñoz del Corral and Lamberto A. Rubio Felipe. *Instituto del Hierro y del Acero*, v. 10, no. 53, July-Sept. 1957, p. 355-363.

Developes a simple mechanical method for measuring internal stresses in electrodeposited metals.

3715 The Alternating Current Electrolysis of Concentrated Acids. R. Bentley and T. R. Prentice. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 619-626.

A study of the corrosion of stainless steel, Au, and Pt electrodes when L.F. a.c. were passed through concentrated acids. Corrosion was not evident at frequencies greater than a few kc. per sec.

3716 Science for Electroplaters. XXXI. Cyanide Waste Treatment—Chlorination. L. Serota. *Metal Finishing*, v. 55, Dec 1957, p. 77-80.

Chlorine is used to oxidize, in a basic solution, the cyanide radical to cyanate which, upon further oxidation, produces the decomposition products CO_2 and N or N compounds.

3717* Acid Copper Plating With Particular Reference to the Use of the "Ubryco" Process. M. R. Marshall. *Metal Finishing Journal*, v. 3, Nov. 1957, p. 457 + 2 pages.

Applications, costs, problems, and operating details.

3718* Electroforming of Linear Accelerator Structures. James A. Pope. *Plating*, v. 44, Dec. 1957, p. 1291-1296.

Equipment and techniques used at Stanford University for the electroforming of Cu linear electron accelerator structures.

3719 Motor Generators for Electroplating. Principles, Construction, Historical Review. II. *Products Finishing*, v. 22, Dec. 1957, p. 54 + 6 pages.

Development of the plating generator. Multipolar dynamos; direct-driven generators.

3720* (Russian.) Investigation of the Physical and Chemical Properties of Electrolytes for Industrial Aluminum Electrolysis. **Issledovanie fiziko-khimicheskikh svoistv elektrolitov promyshlennykh aliuminievykh elektrolizerov.** N. I. Novikov and A. I. Beliaev. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 46-53.

Laboratory studies of fusibility, density, viscosity, and electric conductivity of electrolytes.

3721* (Russian.) Some Problems in the Theory of the Electrodeposition of Alloys. **Nekotorye voprosy teorii elektroosazhdeniia splavov. IV.** Oscillographic Investigation of the Cathode Potential in the Process of Electrodeposition of Alloys. **Ostsillograficheskoe issledovanie potentsiala katoda v protsesse osazhdeniia splavov.** Iu. M. Polukarov and K. M. Gorbunova. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2281-2287.

Electrodeposition of Ag-Hg and Ag-Cd alloys. Mechanism of the concurrent discharge at the cathode of ions of several metals to form an alloy. Simultaneous ion discharge during the formation of a solid solution. Side effects and fluctuations in the cathode potential.

See also: **4010** (coatings for springs); **4018** (salt-spray testing of plated parts); **4190** (peening of electroplated parts).

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3722* (French.) Results From Applying the Diversity Method to Radar. **Performances d'un radar diversité.** S. Herscovici and A. Detape. *Annales de Radioélectricité*, v. 12, no. 50, Oct. 1957, p. 285-298.

Important improvements in maximum range and continuity of detection. Probability calculations enables all of the information at the output of a receiver or of a multi-channel combiner circuit to be obtained.

3723* The Response of Relay Amplifiers With Feedback. John E. Gibson and Franz B. Tuteur. *Applications and Industry*, 1957, no. 33, Nov., p. 303-307.

The static response to step function inputs to a relay amplifier with feedback is linear over the normal operating range. The dynamic response of such amplifier is discussed and the response to sine-wave inputs determined.

3724* Scattering of Electromagnetic Waves by an Acoustic Disturbance in the Atmosphere. Andreas Tonning. *Applied Scientific Research*, v. 6, sec. B, no. 6, 1957, p. 401-421.

Variations in density associated with an acoustic wave are shown to influence the propagation of an electromagnetic wave. The variation in electric permittivity of the atmosphere caused by an acoustic wave is expressed by the power density of the wave.

3725* An Electrometer Amplifier With Two Dynamic Condensers. R. J. Ritsma. *Applied Scientific Research*, v. 6, sec. B, no. 6, 1957, p. 429-445.

Converting a d.c. charge into A.F. signal by means of a capacitive modulator. By using a modulator with two dynamic condensers, vibrating the opposite phase, the converted L.F. noise contributions are eliminated so that the minimum detectable charge is dependent only upon the shot noise of the plate current of the associated vacuum tube.

3726 Propagation of Millimeter Waves Through the Atmosphere. A. B. Crawford and D. C. Hogg. *Bell Laboratories Record*, v. 35, Dec. 1957, p. 494-497.

Millimeter waves are propagated through the atmosphere toward two reflectors located at different distances from the transmitter, so that the difference in the energies of the two reflected waves is a measure of the absorption.

3727 Signal-to-Noise Ratios in Strong-Carrier FM Systems. Harry Urkowitz. *Communication and Electronics*, 1957, Nov., p. 599-602.

General formulas are derived for determining the signal-to-noise ratio with periodic modulation or with pulse modulation, and numerical results are given for the special case of a flat symmetrical R.F. passband.

3728 Design Factors for the Optimization of Multichannel Radio Systems. Charles A. Parry. *Communication and Electronics*, 1957, Nov., p. 606-620.

3729 The Response of Resistance Voltage Dividers to Steep-Front Impulse Waves. A. F. Rohlfs, J. S. Kresge, and F. A. Fisher. *Communication and Electronics*, 1957, Nov., p. 634-646.

Two methods for determining response were developed. One involves a comparison of divider input and response waves through use of a suitable amplifier, and includes a calibration of test equipment. The second involves calculation of response to any applied wave based on measured response to a square wave.

3730 Dynamic Operation of Magnetic Amplifiers With Real-Core and Rectifier Functions. H. C. Bourne, Jr. and D. Nitzan. *Communication and Electronics*, 1957, Nov., p. 646-655.

3731* (French.) Theoretical Results Concerning Thin Layers of Indium Antimonide. **Résultats théoriques concernant les couches minces d'antimoniure d'indium.** Antoine Colombani and Jacques Launay. *Comptes Rendus*, v. 245, no. 19, Nov. 4, 1957, p. 1607-1708.

Determination of electron constants of thin layers of InSb behaving as electronic semiconductors at room temperature.

3732* (Russian.) A Contribution to the General Theory of Non-Regular Wave Guides. **K obshchei teorii nereguliarnykh volnovodov.** B. Z. Katsenelenbaum. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 203-206.

Theoretical analysis.

3733* Selection and Application of Travelling Wave Tubes. II. N. Hansen and A. Nielsen. *Electronic Design*, v. 5, Dec. 1, 1957, p. 36-39.

Design of solenoids and power supplies associated with travelling wave tubes.

3734* Electronic Designers' Handbook. Robert W. Landee, Donovan C. Davis, and Albert P. Albrecht. Sections individually paged. 1957. McGraw-Hill, New York. (TK7815 L23e Ref.)

Fundamentals and data to aid in the design of all types of electronic equipment.

3735 Applications of a New Type of Cold Cathode Trigger Tube. III. G. O. Crowther and K. F. Gimson. *Electronic Engineering*, v. 29, Dec. 1957, p. 591-596.

Electronic counting, switching, and self extinguishing circuits; power supplies.

3736 A Millivoltmeter for Ultra High Frequencies. C. C. Eaglesfield. *Electronic Engineering*, v. 29, Dec. 1957, p. 603-604.

Technique for making measurements at frequencies up to a few hundred Mc per sec. consists of using a modulated signal generator and having a crystal diode probe to detect the modulation.

3737 Heat Transfer in Power Transistors. Ioury G. Maloff. *Electronic Industries & Tele-Tech*, v. 16, Dec. 1957, p. 54 + 7 pages.

Specific conditions and variable parameters must be determined before the whole mechanism of heat transfer can be evaluated. A main power transistor limitation, maximum junction operating temperature, precludes exaggeration of evaluation importance.

3738 Designing Low-Noise Microwave Receivers. II. C. T. McCoy. *Electronic Industries & Tele-Tech*, v. 16, Dec. 1957, p. 64 + 4 pages.

A reliable microwave receiver with noise figure in the 6-db range can be designed on the basis of theory and practical suggestions resulting from low noise research studies over the past few yrs. Experimental data on microwave crystal mixers are included.

3739 Ultrasonics—The New Electronic Art. II. John E. Hickey, Jr. *Electronic Industries & Tele-Tech*, v. 16, Dec. 1957, p. 71 + 4 pages.

Ultrasonics has branched out into a wide variety of slicing, machining, measuring, drilling, and burglar alarm applications. How the ultrasonic motion is applied, and how to choose the right transducers and generators for a given operation are described.

3740* Direct-Coupled Amplifiers. D. J. R. Martin. *Electronic & Radio Engineer*, v. 34, Dec. 1957, p. 438-441.

A method of artificially matching valves to obtain improved mutual compensation for the effects of normal heater-supply voltage changes.

3741* Waveguide Design for Die-Casting, Allowing for Wall Taper. P. Humphreys. *Electronic & Radio Engineer*, v. 34, Dec. 1957, p. 441-447.

Components which have been designed for normal rectangular waveguides may be modified on a theoretical basis to make them suitable for die-casting manufacturing methods.

3742* The Transactor. An Idealized Active Network Element. A. W. Keen. *Electronic & Radio Engineer*, v. 34, Dec. 1957, p. 459-461.

The two-terminal constant-current and constant-voltage generators used in equivalent circuits of active networks are replaced by transmission-type active elements called "transactors" in order to display more accurately the transmission properties of such networks. Four variants of the transactor are distinguished and their inter-relationship is established.

3743 How Transistors Operate Under Atomic Radiation. Robert L. Riddle. *Electronics*, v. 30, Dec. 1, 1957, p. 125-127.

Results of tests exposing transistor amplifier and single transistor to radiation from a nuclear reactor show that degrading effects of irradiation can be controlled to some degree by use of negative feedback when applicable. Radiation effects on coaxial cables showed no noticeable change in r-f transmission characteristics.

3744 Transistor Relays Have Low Idling Current. D. W. R. McKinley. *Electronics*, v. 30, Dec. 1, 1957, p. 147.

Electronic relays of remote-control devices operate electromechanical relays requiring 2 or 3 w. and consume few microamperes when idling. Circuits for c-w audio and pulsed-video control signals are shown.

3745* (Russian.) Evaluation of Non-Linear Properties of Junction-Type Triodes. **Otsenka nelineinykh svoistv ploskostnykh triodov.** A. I. Borisov. *Elektrosviaz'*, v. 11, Dec. 1957, p. 37-44.

Characteristic basic non-linear properties of junction-type triodes; method for selection of triode components.

3746* (Russian.) Application of Semi-Conductor Triodes in Amplifiers to a Multi-Channel System of High-Frequency Telephony. **Primenenie poluprovodnikovykh triodov v usiliteliakh mnogokanal'nykh sistem vysokochastotnogo telefonirovaniia.** Iu. D. Farber. *Elektrosviaz'*, v. 11, Dec. 1957, p. 50-57.

Applicability of semiconductor triodes and formulation of requirements for development of auxiliary amplifiers for the "K-24" system.

3747* (Italian.) Study of the Stability of an Audio-Frequency Amplifier With Negative Reaction. **Studio della stabilità di un amplificatore di potenza per audiofrequenze con reazione negativa.** Roggero Marè. *Elettronica*, v. 6, no. 3, 1957, p. 128-143.

Choice of the circuit. Calculation of the gain at intermediate frequencies. Stability at low and high frequencies. Corrective networks producing amplifier stability.

3748 Industrial Electronics Circuits. R. Kretzmann. (Translated from the German by D. J. Mitchell.) 194 p. 1957. Philosophical Library, New York. (TK7815 K88i2)

Nearly 200 circuits are described, including functions of the various circuit elements and comprehensive information on actual component values.

3749 A Thin Cathode-Ray Tube. W. R. Aiken. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1599-1604.

Beam is injected parallel to one edge of the thin tube and caused to pass through two right-angle deflections: the first sends the beam into the region between the front and back tube surfaces and the second turns it into the phosphor-coated front surface.

3750 New Microwave Repeater System Using a Single Traveling-Wave Tube as Both Amplifier and Local Oscillator. H. Kurokawa, I. Someya, and M. Morita. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1604-1611.

System uses a minimum number of vacuum tubes and requires no afc because of the inherent stability of the local oscillator frequency due to the use of a high-Q cavity resonator in the feedback circuit of the traveling-wave tube.

3751 The Principles of JANET—A Meteor-Burst Communication System. P. A. Forsyth, E. L. Vogan, D. R. Hansen, and C. O. Hines. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1642-1657.

The JANET system of long-range communication employs V.H.F. radio signals which are forward-scattered by the ionized trails of individual meteors. The propagation characteristics and design considerations of such a system are surveyed and preliminary operating experience is summarized.

3752 Storage Capacity in Burst-Type Communication Systems. L. Lorne Campbell. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1661-1666.

The relationship between storage capacity and mean rate of transfer of information is derived for a burst communication system of the JANET type. Specific probability distributions are then assumed for the durations of signals and the intervals between signals.

3753 Intermittent Communication With a Fluctuating Signal. G. Franklin Montgomery. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1678-1684.

Intermittent transmission is proposed as a method to combat the effects of signal fading. Message error and average transmission rate are functions of operating bandwidth and threshold signal-to-noise ratio.

3754 Directional Characteristics of Meteor Propagation Derived From Radar Measurements. V. R. Eshleman and R. F. Mlodnosky. *I. R. E., Proceedings*, v. 45, Dec. 1957, p. 1715-1723.

3755 Radiation From a Radial Dipole Through a Thin Dielectric Spherical Shell. M. G. Andreasen. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 337-342. (TK1 In6.6ap Vis.)

Numerical results were obtained for the gain pattern and the impedance change of an elementary dipole. The nearer the center of the shell the dipole is placed, the less the pattern is found to be influenced by the shell, the opposite being the case for the impedance of the dipole.

3756 The Current Distribution and Input Impedance of Cylindrical Antennas. E. V. Bohn. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 343-348. (TK1 In6.6ap Vis.)

Treats both the formulation of the problem and its solution in a fundamental way permitting only approximations which appear evident. A system of four integro-differential equations is derived and these are applied to the cylindrical antenna problem.

3757 Scanning Lens Design for Minimum Mean-Square Phase Error. E. K. Proctor and M. H. Rees. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 348-355. (TK1 In6.6ap Vis.)

Microwave lenses of the constraining or binormal type having superior wide-angle scanning properties can be achieved by suitable choice of lens contours and of the manner in which the index of refraction varies from point to point across the aperture plane.

3758 Second-Order Beams of Two-Dimensional Slot Arrays. L. A. Kurtz and J. S. Yee. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 356-362. (TK1 In6.6ap Vis.)

Second-order beams in the space patterns of two-dimensional slot array antennas may far exceed the sidelobe level and therefore increase the susceptibility of a search radar to jamming or to spurious target echoes. Expressions are derived for the positions of the second-order beams and for their amplitudes relative to the main beam.

3759 20-70 MC Monopole Antennas on Ground-Based Vehicles. Robert E. Webster. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 363-368. (TK1 In6.6ap Vis.)

Antenna design for ground-based vehicular application is discussed with particular emphasis on omnidirectional, vertically polarized types.

3760 New Method of Antenna Array Synthesis Applied to Generation of Double-Step Patterns. C. J. Sletten, P. Blacksmith, Jr., and G. R. Forbes, Jr. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 369-373. (TK1 In6.6ap Vis.)

A method of synthesizing linear antenna arrays utilizes the natural phase distribution that exists on transmission lines.

3761 Convergent Representations for the Radiation Fields From Slots in Large Circular Cylinders. L. L. Bailin and R. J. Spellmire. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 374-383. (TK1 In6.6ap Vis.)

This derivation is accomplished by applying a Watson transformation to the slowly convergent harmonic series representation and then evaluating the resulting integral to third order with the techniques of Van der Pol and Bremmer.

3762 Some Observations on Scattering by Turbulent Inhomogeneities. Martin Balser. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 383-390. (TK1 In6.6ap Vis.)

Several topics in the theory of radio wave scattering by dielectric inhomogeneities due to turbulence are discussed. It is suggested that the frequency dependence of the time correlation function may give more information about the nature of the turbulence.

3763 Scanning Characteristics of Microwave Aplanatic Lenses. G. G. Cloutier and G. Bekefi. *Institute of Radio Engineers, Transactions on Antennas and Propagation*, v. AP-5, Oct. 1957, p. 391-396. (TK1 In6.6ap Vis.)

The imaging properties of two types of solid dielectric, circularly symmetric lenses were studied at a wavelength of 1.25 cm. Measurements disclosed that in these lenses (having focal number of 1.5), a beam, of half-power width 1.25°, could be scanned up to about 20° of arc from the optical axis by displacement of the source.

3764 Survey of Some Properties of Linear Networks. E. Folke Bolinder. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 70-78. (TK1 In6.6c Vis.)

Passivity of linear networks. Maximum efficiency of linear two-terminal-pair networks; geometrical works on the efficiency of two-terminal-pair networks.

3765 Active RC Networks. Richard D. Thornton. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 78-89. (TK1 In6.6c Vis.)

The limits on allowed natural frequencies in terms of the eigen values of a frequency matrix are determined and related to the maximum power that can be dissipated by the device per unit energy stored in the terminal capacity.

3766 About Such Things as Unistors, Flow Graphs, Probability, Partial Factoring, and Matrices. Samuel J. Mason. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 90-97. (TK1 In6.6c Vis.)

Topological circuit analysis. The expression for a flowgraph transmission in terms of the branch transmissions. Simultaneous linear matrix equations conveniently expressed in flow-graph form.

3767 Multipole Analysis of Active Networks. Lotfi A. Zadeh. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 97-105. (TK1 In6.6c Vis.)

Basic concepts and theorems of the multipole method.

3768 Transformation Theory Applied to Linear Active and/or Nonbilateral Networks. Ernst A. Guillemin. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 106-111. (TK1 In6.6c Vis.)

3769 Negative Impedance Circuits—Some Basic Relations and Limitations. W. Ralph Lundry. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 132-139. (TK1 In6.6c Vis.)

Ideal negative impedance converter and inverter. Analysis of specific circuits.

3770 Design Principles for Single Loop Transistor Feedback Amplifiers. Franklin H. Blecher. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 145-156. (TK1 In6.6c Vis.)

Criterion of stability for either calculating or measuring the stability margins of transistor amplifiers.

3771 Design of Conditionally Stable Feedback Systems. J. Oizumi and M. Kimura. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 157-166. (TK1 In6.6c Vis.)

Some typical conditionally stable types of loop transfer function are first derived, and the maximum obtainable feedback and the relation between the available feedback and the gain and phase margins are described with respect to the most typical one of these functions.

3772 Wide-Band Feedback Amplifiers. Fred D. Waldhauer. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 178-190. (TK1 In6.6c Vis.)

Choice of configuration affects many qualities of a feedback amplifier—transient performance, gain stability, open end and closed-loop frequency response. Properties of various configurations are discussed and selection explained.

3773 Some Solutions to Problems of Operating Germanium Transistor Servo Amplifiers at High Ambient Temperatures. P. M. Thompson and J. Mitchell. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 190-193. (TK1 In6.6c Vis.)

3774 Bias Considerations in Transistor Circuit Design. Sorab K. Ghandhi. *Institute of Radio Engineers, Transactions on Circuit Theory*, v. CT-4, Sept. 1957, p. 194-202. (TK1 In6.6c Vis.)

A coherent treatment of the problem of a transistor's tendency to shift its operating point with temperature.

3775 Quadruple-Diversity Tropospheric Scatter Systems. William G. Long and R. Ray Weeks. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Dec. 1957, p. 8-19. (TK1 In6.6cs Vis.)

Using present operational equipments, quadruple-diversity reception can be employed with only two parabolic reflectors per terminal. System utilizes the "operational spare" concept to advantage from both the equipment reliability and propagation reliability standpoints. Communications are feasible for circuits of over 300 miles.

3776 High-Speed Frequency-Shift Keying of LF and VLF Radio Circuits. H. G. Wolff. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Dec. 1957, p. 29-42. (TK1 In6.6cs Vis.)

To permit increase in transmission speed of V.L.F. transmitters, a method is developed which makes use of variation of reactance of the antenna circuit in synchronism with frequency shift modulation of the carrier. The method makes it possible to transmit teletype or high-speed Morse signals at 100 words per min. or more.

3777 Very High-Power Transistors With Evaporated Aluminum Electrodes. H. W. Henkels and G. Strull. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Oct. 1957, p. 291-294. (TK1 In6.6ed Vis.)

Important factors in high-gain, high-current transistor design are the emitter-injection efficiency, emitter and collector planarity, and base-bias high-current falloff. Fabrication techniques involved in the production of transistors to maximize the injection efficiency and planarity (by evaporation of Al electrodes) and minimize base bias drop (by choice of optimum emitter geometry), are discussed.

3778 A Method of Accurate Thickness Determination of Germanium Wafers Suitable for Transistor Production. A. R. Moore. *Institute of Radio Engineers, Transactions on Electron Devices*, v. ED-4, Oct. 1957, p. 309-310. (TK1 In6.6ed Vis.)

An X-ray absorption method of determining thickness of the wafers is simple and straightforward. Will give a resulting thickness determination which depends only on the mass absorption of the Ge.

3779* Thermal Turnover in Germanium P-N Junctions. A. W. Matz. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, no. 18, Nov. 1957, p. 555-564.

The static reverse characteristics of an alloyed Ge *p-n* junction are analyzed, taking into account an avalanche multiplication factor. The condition for thermal stability is examined, the onset of thermal runaway is related to a thermal turnover phenomenon, and the existence of a negative-resistance region is predicted.

3780* Transistor Circuits and Applications. A. G. Milnes. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, no. 18, Nov. 1957, p. 565-585.

Developments in circuit technology. Basic applications surveyed include low-level and power amplifiers, square-wave and sinusoidal oscillators, power convertors and regulators, waveform-shaping and computing circuits, and low-level and power-switching circuits.

3781* The Frequency-Lock A.F.C. Circuit as a Means of Tracking Signals of Changing Frequency in Conditions of Low Signal/Noise Ratio. R. Leek. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, no. 18, Nov. 1957, p. 587-597.

3782* Characteristics of Some Ferrous and Non-Ferrous Waveguides, at 27 Gc/s. J. Allison, F. A. Benson, and M. S. Seaman. *Institute of Electrical Engineers, Proceedings*, v. 104, pt. B, no. 18, Nov. 1957, p. 599-602.

Measurements of the attenuations produced by air-filled, rectangular waveguides of brass, Cu, Al, Ni-Ag, Ni, mild-steel, Radiometal, Rhometal, and Mumetal; effective permeabilities.

3783* On the Electron Gun With Hairpin Cathode. The Intensity of Emission and the Nature of the Electron Source. K. T. Dolder and O. Klemperer. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 439-454.

An experimental investigation of the nature of the sources has led to the conclusion that the emission can be projected either directly from the tip of the cathode, or passes through a crossover, or is drawn from a virtual cathode in which electrons have come almost to rest.

3784* Anisotropic Diffusion Lengths in Germanium and Silicon Crystals Containing Parallel Arrays of Edge Dislocations. R. L. Bell and C. A. Hogarth. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 455-470.

Techniques for introducing parallel arrays of edge dislocations into Ge and Si by means of plastic bending.

3785* New Effects of an Auxiliary Electrode on a Discharge at Low Pressure. Thong Saw Pak. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 471-480.

In a Hg-vapor discharge at low pressures with a hot-wire cathode, an auxiliary electrode placed close to the cathode is found to be capable of switching the discharge on and off when its potential is changed by a very small amount.

3786* A Simple Derivation of the Thermoelectric Voltage in a Non-Degenerate Semiconductor. F. W. G. Rose, E. Billig, and J. E. Parrott. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 481-486.

The thermoelectric voltage in a non-degenerate semiconductor is derived, using only such well-known concepts as Fermi levels, field current, and diffusion current.

3787* The Crystalline Perfection of Some Semiconductor Single Crystals. R. L. Bell. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 487-493.

Single crystals of Ge, Si, InSb, and HgTe were examined by the Guinier-Tennevin X-ray technique.

3788* The Transverse Magnetoresistance Effect in Indium Arsenide. C. H. Champness and R. P. Chasmar. *Journal of Electronics and Control*, v. 3, no. 5, Nov. 1957, p. 494-499.

Measurements of the transverse magnetoresistance effect were made on samples of InAs of various shapes. For a long thin sample the magnitude of this effect is considerably smaller than expected for acoustic lattice scattering.

3789* Excitation of Surface Waves on Conducting, Stratified, Dielectric-Clad, and Corrugated Surfaces. James R. Wait. *Journal of Research, National Bureau of Standards*, v. 59, Dec. 1957, p. 365-377.

An expression for the field of an electric dipole located over a flat surface with a specified surface impedance Z is derived from the formal integral solution by a modified saddle-point method.

3790* An Apparatus for Measuring the Piezoresistivity of Semiconductors. R. F. Potter and W. J. McKean. *Journal of Research, National Bureau of Standards,* v. 59, Dec. 1957, p. 427-430.

Apparatus was used for measurements on InSb over the range 78 to 300 K. Tensile stresses of the order of 5 x 10^7 dynes per sq.in. can be applied to samples that are cut in a special manner.

3791 A Low Frequency Random Signal Generator. J. C. West and G. T. Roberts. *Journal of Scientific Instruments,* v. 34, Nov. 1957, p. 447-450.

Simple method of generating a L.F. random signal having a spectrum extending down to zero frequency, and using a gas discharge tube as the primary noise source.

3792* (Hungarian.) Photoelectrical Optical Amplifier. **Fotoelektromos optikai erősítő.** Mihály Tóth. *Magyar Fizikai Folyoirat,* v. 5, no. 1, 1957, p. 17-18.

Possibilities for measuring low direct voltages in the presence of low internal resistance. Description of an optical amplifier with double-light channel.

3793 (English.) **Noise and Impedance Measurements in Voltage Regulator Tubes.** A. Van Der Ziel and E. R. Chenette. *Physica,* v. 23, Oct. 1957, p. 943-952.

Measurements over a frequency range of 1 cycle/sec to 30 mc/sec.

3794 Annealing of Electron Bombardment Damage in Silicon Crystals. G. Bemski and W. M. Augustyniak. *Physical Review,* v. 108, ser. 2, Nov. 1, 1957, p. 645-648.

Annealing was found to proceed with an activation energy of 1.3 e.v. This is interpreted as being the activation energy associated with the lattice jump frequency.

3795 Piezoresistance of Indium Antimonide. Roy F. Potter. *Physical Review,* v. 108, ser. 2, Nov. 1, 1957, p. 652-658.

3796 Galvanomagnetic Effects in *n*-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review,* v. 108, ser. 2, Dec. 1, 1957, p. 1136-1145.

The magnetic field dependence of the magnetoresistive effects and the Hall coefficient were investigated at 78 K and liquid He temperatures.

3797 Galvanomagnetic Effects in *p*-Type Indium Antimonide. H. P. R. Frederikse and W. R. Hosler. *Physical Review,* v. 108, ser. 2, Dec. 1, 1957, p. 1146-1151.

Conductivity and Hall effect were measured as a function of magnetic field strength and of temperature.

3798* (Russian.) Utilization of Ferromagnetic Resonance in Ferrite Waveguide Valves. **Ferritovye volnovodnye ventili s ispol'zovaniem ferromagnitnogo rezonansa.** A. L. Mikaelian and A. K. Stoliarov. *Radiotekhnika,* v. 12, no. 10, Oct. 1957, p. 17-30.

Development of the theory and design of resonance valves intended for use in radio relay systems and measuring techniques. Basic results in theoretical and experimental investigation of ferromagnetic resonance phenomena.

3799* (Russian.) Power Triode RGM-500 With Continuous Evacuation. **Generatornyi triod s nepreryvnoi otkachkoi RGM-500.** A. L. Mints, M. I. Basalaev, N. I. Oganov, and E. V. Rudnev. *Radiotekhnika i Elektronika,* v. 2, no. 10, Oct. 1957, p. 1240-1252.

Construction of demountable power vacuum triode with continuous evacuation and a capacity of 500 kw., tested in operation on medium and short waves.

3800* (Russian.) Effect of Admixture Distribution in the Base of Drift Triodes on Their Frequency Properties. **Vliianie raspredeleniia primesei v baze dreifovykh triodov na ikh chastotnye svoistva.** Ia. A. Fedotov. *Radiotekhnika i Elektronika,* v. 2, no. 10, Oct. 1957, p. 1261-1270.

Derivation of basic relations determining properties and parameters of drift crystal triodes.

3801* (Russian.) Anomalous Polarization Plane Rotation Effected by Space Resonance in a Gyromagnetic Waveguide of Limited Length. **Anomal'noe vrashchenie ploskosti poliarizatsii, obuslovlennoe ob'emnym rezonansom v giromagnitnom volnovode konechnoi dliny.** L. G. Lomize. *Radiotekhnika i Elektronika,* v. 2, no. 10, Oct. 1957, p. 1297-1299.

Experimental curves illustrating anomalous rotation of the polarization plane by cavity resonance in a ferrite specimen. Calculations indicating possibility of rotation of the polarization plane in the opposite direction.

3802* (Russian.) Phase-Lock Automatic Frequency Control of a Klystron With Respect to a Molecular Oscillator. **Fazovaia avtopodstroika klistrona po molekuliarnomu generatoru.** G. A. Vasneva, et al. *Radiotekhnika i Elektronika,* v. 2, no. 10, Oct. 1957, p. 1300.

3803* (Russian.) On the Kinetics of Electrons in a Discharge Effected in a Magnetic Field at Low Pressures. **O kinetike elektronov v razriade v magnitnom pole pri nizkikh davleniiakh.** G. V. Smirnitskaia and E. M. Reikhrudel'. *Radiotekhnika i Elektronika,* v. 2, no. 10, Oct. 1957, p. 1303-1306.

Mathematical calculations of electron trajectories in given field configurations.

3804 Report of the Meeting on Semiconductors Held by the Physical Society in Collaboration With British Thomson-Houston, Ltd., Rugby, 1956. 153 p. (TK3376 P56r)

A collection of 23 papers concerning the properties and uses of various semiconductor materials.

3805 Fast Gray Wedge Analyzer for High Input Rates. J. T. Flynn and F. A. Johnson. *Review of Scientific Instruments,* v. 28, Nov. 1957, p. 867-874.

Operation of pulse-height analyzer depends on two trigger circuits which are initiated by the input pulse. Pulses of fixed amplitude (100 and 30mμ sec. long) from the trigger circuits operate two gates, a pulse lengthener, a sweep, and an unblanking circuit.

3806 Synthesis of Passive Networks. Ernst A. Guillemin. John Wiley & Sons, New York. (TK3226 G94s)

Theoretical basis for linear passive synthesis procedures.

3807* (Russian.) Color Calculations in Color TV. **Tsvetovye raschety v tsvetnom televidenii.** A. K. Kustarev. *Tekhnika Kino i Televideniia,* 1957, no. 11, Nov., p. 51-61.

Derivation of formulas of transformation of color coordinates, when the systems, between which the transition occurs, are expressed in a third system. Some individual cases and various expressions of transition formulas. Geometrical interpretation of transition formulas permitting graphical determination of matrix elements of transition.

3808 Long Ranges of VHF, UHF, and SHF. H. Poeverlein. *U. S. Air Force, Cambridge Research Center,* AFCRC-TR-57-117, Sept. 1957, 30 p. (Translated from *Zeitschrift für Angewandte Physik,* v. 8, no. 5, 1956, p. 244-254.) (TK7800 Un3.12b Contin.)

Diffraction around the earth. Refraction and reflection in the troposphere. Tropospheric scattering. Ionospheric and meteoric scattering.

3809* (Russian.) The Behavior of Non-Metallic Crystals in Strong Electric Fields. **O povedenii nemetallicheskikh kristallov v sil'nykh elektricheskikh poliakh.** L. V. Keldysh. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki,* v. 33, no. 4, 1957, p. 994-1003.

An expression was obtained for the number of electron-hole pairs generated in a semiconductor by a uniform electric field. The consideration is made for an arbitrary crystal.

3810* (Russian.) Dependence of Lifetime of Foreign Current Carriers Upon Concentration of Antimony Admixture in Germanium. **Zavisimost' vremeni zhizni storonnikh nositelei toka ot kontsentratsii primesi sur'my v germanii.** V. E. Lashkarev, V. G. Litovchenko, N. M. Omel'ianovskaia, R. N. Bondarenko, and V. I. Strikha. *Zhurnal Tekhnicheskoi Fiziki,* v. 27, no. 11, Nov. 1957, p. 2437-2439.

Concentrations close to the limit of solubility of Sb in Ge ($n = 4x10^{18}$ cm^{-3}) are studied.

3811* (Russian.) Investigation of Recombination of Current Carriers in Germanium With Admixture of Iron. **Issledovanie rekombinatsii nositelei toka v germanii s primes'iu zheleza.** K. D. Glinchuk, E. G. Miseliuk, and N. N. Fortunatova. *Zhurnal Tekhnicheskoi Fiziki,* v. 27, no. 11, Nov. 1957, p. 2451-2457.

Effect of annealing on condition of acceptor levels and recombination lifetime.

3812* (Russian.) Distribution of Non-Equilibrium Current Carriers in the Basic Region of the p-n-Junction With High Injection Coefficient. **Raspredelenie neravnovesnykh nositelei zariada v bazovoi oblasti p-n-perekhoda s vysokim koeffitsientom inektsii.** M. I. Iglitsyn, Iu. A. Kontsevoi, and A. I. Sidorov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2458-2460.

3813* (Russian.) Measurement of Small Lifetime of Current Carriers in Germanium. **Izmerenie malykh vremen zhizni nositelei zariada v germanii.** L. S. Smirnov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2469-2471.

Permits measurement of lifetime of current carriers from 2×10^{-6} to 10^{-6} sec. This method is convenient for detection of lifetime temperature-dependence.

3814* (Russian.) Characteristics of Additional Conductivity of Cadmium Selenide Single Crystals Under X-Ray Excitation. **Kharakteristiki dobavochnoi provodimosti mono-kristallov selenistogo kadmiia pri vozbuzhdenii rentgenovskimi luchami. I.** Static Characteristics. **Staticheskie kharakteristiki. II.** Kinetic Features. **Osobennosti kinetiki.** S. V. Svechnikov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2492-2506.

Features of volt-ampere and dosimetric characteristics of single crystal CdSe during X-ray excitation.

3815* (Russian.) On Compensation of Space Charge in an Electron Beam. **O kompensatsii prostranstrennogo zariada elektronnogo puchka.** V. I. Volosok and B. V. Chirikov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2624-2630.

Compensation is provided by ions, formed during ionization of residual gas. A quantitative explanation of observed phenomena is presented.

3816* (Russian.) On Electrostatic Electron Emission of Semiconductors. **K voprosu ob elektrostaticheskoi elektronnoi emissii poluprovodnikov.** I. I. Gofman, B. G. Smirnov, G. S. Soirin, and G. N. Shuppe. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2662-2663 + 1 plate.

Results of electrostatic electron emission investigation obtained in static conditions with a WC contact.

3817* (Russian.) Influence of Annealing on Local Levels and the Lifetime of Non-Equilibrium Current Carriers in Germanium With Iron as Impurity. **Vliianie otzhiga na lokal'nye urovni i vremia zhizni neravnovesnykh nositelei toka v germanii s primes'iu zheleza.** K. D. Glinchuk, E. G. Miseliuk, and N. N. Fortunatova. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2666-2667.

See also: **3390** (segregation coefficients in Si); **3662** (analog computer for design of F.M. systems); **3982** (vibration mounts for electronic equipment); **4412** (mμ. sec. coincidence circuit for counting); **4491** (electrodeless discharge tubes).

ENGINEERING ECONOMICS

3818 The Cup and Saucer Effect. F. R. Palmer. *American Iron and Steel Institute, Preprint*, 1957, 9 p. (TS300 Am35ta Vis.)

Suggests a cure for this cyclic demand-supply cycle in steel.

3819* Economic Evaluation of Industrial Power-System Reliability. W. H. Dickinson. *Applications and Industry*, 1957, no. 33, Nov., p. 264-272.

Methods for analysis of relative reliability of different types of industrial power systems and the economic evaluation of the improvement in reliability which results with alternative types of systems.

3820 Cause and Control of the Business Cycle. E. C. Harwood. 5th Ed., 160 p. 1957. American Institute for Economic Research, Great Barrington, Mass. (HB3711 H26c5)

Reasons for inflation and deflation; variation in commodity prices; significance of gold. Control possibilities.

3821 Economics of Atomic Energy. Mary Goldring. 179 p. 1957. Philosophical Library, New York. (HD9698 G56e)

An analysis of the British nuclear power program, covering fuel sources and preparation, scale of investment, costs of atomic power, export market, British pattern of development, other countries' progress, and the outlook for the future.

3822 The Iron and Steel Industry in Europe. 93 p. 1957. Organisation for European Economic Co-operation, Paris. (HD9525.A2 Or3i)

Statistics on production, internal demand, trade, and price trends. Present day problems and prospects.

3823 Market Researeh Methods in Europe. 189 p. 1956. European Productivity Agency of the Organisation for European Economic Co-operation, Paris. (HF5415 Or4m)

Current methods; patterns of organization; rationalization of market research by improving its methods and organization; measures to increase the application of market research.

3824 Markets for Materials—1957. *Modern Plastics*, v. 35, Jan. 1958, p. 85 + 43 pages.

Record for 1957 and 1958 prospects of molding and extrusion materials. Phenolics, urea, melamine, cellulosics, acrylics, polystyrene, vinyl chloride, polyethylene, and nylon.

3825 Which Depreciation Method Is Best? B. J. Gaffney. *Petroleum Refiner*, v. 36, Dec. 1957, p. 137-146.

Seven different depreciation methods are analyzed and compared.

3826 The Pulp and Paper Industry in Europe. Its Trend From 1950 to 1955. Its Future Prospects. 60 p. 1957. Organisation for European Economic Co-operation, Paris. (HD9835 Or3p Over.)

Statistics on production and consumption.

3827 Soap, Detergents, Paint, Varnishes. Marketing Techniques in the United States. 97 p. 1957. Organisation for European Economic Co-operation, Paris. (HD9999.S7 Or3.2s)

Structures of these industries in the U. S. Distribution circuit and outlets; market research. Co-operation and competition.

3828* Forecast for Sulfur. David Gaber. *SRI, Journal*, v. 1, no. 4, 1957, p. 114-118.

The U. S. and Europe account for three-fourths of the world's sulfur consumption. Information regarding sources and uses today, and estimates for 1956, are presented from data collected in a survey.

FLUID MECHANICS

3829* (English.) **Investigation of the Volumetric Loss of a Centrifugal Fan.** M. Blahó and L. Preszler. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 255-261.

Influence of the clearance between the impeller and the suction cone of a centrifugal fan on its efficiency.

3830 Viscous Flow Between Rotating Cylinders and a Sheet Moving Between Them. M. R. Hopkins. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 442-444.

An expression for the thickness of the liquid layer finally left on the sheet is derived in terms of the viscosity of the liquid, size of the rollers, speed at which the sheet moves through them and force with which they are pressed together.

3831 The Damping Effect of Surrounding Gases on a Cylinder in Longitudinal Oscillation. M. T. Browne and J. R. Pattison. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 452-456.

Experiments undertaken to confirm the theoretical estimations indicate a possible precision method for the determination of gas viscosities.

3832 The Velocity of Fall of Circulating and Oscillating Liquid Drops Through Quiescent Liquid Phases. A. I. Johnson and L. Braida. *Canadian Journal of Chemical Engineering*, v. 35, Dec. 1957, p. 165-172.

Organic liquids with physical properties ranging in density from 1.1040 to 2.9612 gms./cc., viscosity from 0.4779 to 9.630 centipoises and interfacial tension from 26.08 to 45.30 dynes/cm. were used as the disperse phases.

3833 Solving Flow Control Problems Graphically. G. A. Martin. *Control Engineering*, v. 4, Dec. 1957, p. 71-75.

Method of determining valve sizes and characteristics, and required piping changes, by plotting system characteristic curves.

3834* (Russian.) Critical Conditions for the Inertial Deposition of Aerosols on a Cylinder and Sphere From a Viscous Flow. **Kriticheskie usloviia inertsionnogo osazhdeniia aerozolei pri viazkom obtekanii tsilindra i shara.** G. L. Natanson. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 109-112.

Theoretical study and mathematical calculations.

3835 Very Fast Flow Control Techniques. Robert W. Ellison. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1996-1998.

Control systems based on conventional aircraft and missile components are used to obtain a response of 50 to 10,000 c.p.s. in large and small propellant apparatus.

3836 Viscosities of Gases at High Pressures. James F. Ross and George Martin Brown. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2026-2033.

The viscosities of CH_4, N, and He were determined in a new type of viscometer using instrument bellows and a capillary tube in the range from 25 to −50 C and 500 to 10,000 lbs. per sq. in. gage.

3837 Metering Gas With a Heated Thermopile. Raymond T. Doyle. *Instruments and Automation*, v. 30, Dec. 1957, p. 2276-2278.

This gas flow indicator is safe for explosive atmospheres.

3838* How to Measure Liquid Interface Levels. I. Mass Methods of Interface Level Measurement. J. R. Hackman. *ISA Journal*, v. 4, Dec. 1957, p. 554-557.

Mass difference and total mass methods. A novel specific gravity compensated interface meter.

3839 A Method for Solving Problems of Irrotational Gas Flow by Means of High-Speed Digital Computers. Toyoki Koga. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 497-500.

Method is described in detail for two-dimensional, steady, irrotational flow (without shocks) of a perfect gas.

3840 Response of Nonlinearly Supported Spherical Boundaries to Shock Waves. M. L. Baron. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 501-505.

An integral transform technique is used to solve a boundary-value problem in which the partial differential equation is linear but the associated boundary condition in nonlinear.

3841 Rising Plane Bubbles. Garrett Birkhoff and David Carter. *Journal of Mathematics and Mechanics*, v. 6, Nov. 1957, p. 769-779.

The approximate determination of the plane potential flow past a symmetrical bubble rising under gravity in a vertical tube with parallel walls.

3842 On the Application of a Statistical Approximation to the Theory of Turbulent Diffusion. P. H. Roberts. *Journal of Mathematics and Mechanics*, v. 6, Nov. 1957, p. 781-799.

3843 A Diffusion Model to Explain Mixing of Flowing Miscible Fluids in Porous Media. J. S. Aronofsky and J. P. Heller. *Journal of Petroleum Technology*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 210, Dec. 1957, p. 345-349.

A mathematical analysis of the fluid mixing which occurs during flow through porous media.

3844 Recent Developments in Fluid Flow. R. C. Binder. *Petroleum Refiner*, v. 36, Dec. 1957, p. 125-129.

A semi-technical review of the significant trends and progress in fluid mechanics.

3845* (English.) **Streaming Current in Turbulent Flows and Metal Capillaries. I. Theory (1). Distribution of Charge in the Liquid. II. Theory (2). Charge Transported by the Flow of Liquid. III. Experiment (1). Aim and Procedure. IV. Experiment (2). Results and Conclusions.** A. A. Boumans. *Physica*, v. 23, no. 11, Nov. 1957, p. 1007-1055.

3846 Radiation Effects in Shock-Wave Structure. Hari K. Sen and Arnold W. Guess. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 560-564.

The over-all effect can be taken as a diminution of the Prandtl number; shock width is larger than when viscosity and heat conduction alone are considered. The radiative contribution to the width of the shock depends on the ratio of the mean free path of radiation to that of the material particles. The proportionate increase in shock width is a function of the Mach number and increases with it.

3847 Observation of Perfect Potential Flow in Superfluid. Paul P. Craig and John R. Pellam. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1109-1112.

The lift on an airfoil in a velocity field of perfect superfluid flow within liquid He II was found to vanish for sufficiently low velocity. Thus the flow is pure potential flow with no circulation, and the viscosity boundary condition of zero velocity at the trailing edge which is normally introduced does not apply.

3848 (French.) Flow Between Two Parallel Planes. A Contribution to the Study of Air Forces. **Écoulement d'un fluide entre deux plans parallèles. Contribution a l'étude des butées d'air.** Raymond Comolet. *Publications Scientifiques et Techniques du Ministère de l'Air*, 1957, no. 334, 83 p. (TL502 F84.1p Vis.)

Analysis of two dimensional longitudinal or radial viscous flow between two stationary parallel planes. Practical applications.

3849* (Romanian.) Determination of the Characteristics of the Boundary Layer by Means of Typical Profiles of Velocities and Temperatures. **Asupra determinării caracteristicilor stratului limită prin utilizarea unor profile tip de viteze şi temperaturi.** St. Săvulescu. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 2, 1957, p. 341-356.

Friction and transfer coefficients and other characteristics of the boundary layer are considered.

3850 Momentum Transfer for Flow Over a Flat Plate With Blowing. H. S. Mickley and R. S. Davis. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4017, Nov. 1957, 64 p. (TL570 Un3t)

Effect on the boundary layer of blowing air through a porous flat plate into a main airstream flowing parallel to the plate. Measurement of velocity profiles and wall friction coefficients.

3851 An Experimental Investigation of the Oscillating Pressures on a Circular Cylinder in a Fluid Stream. D. M. McGregor. *University of Toronto, Institute of Aerophysics, UTIA Technical Note No.* 14, June 1957, 35 p. (TL570 T64.84t Vis.)

3852 Effects of Probe Tip Geometry and Size on Measurements in a Laminar Boundary Layer in Supersonic Flow. Stanley H. Galezowski. *University of Toronto, Institute of Aerophysics, UTIA Technical Note No.* 17, Oct. 1957, 21 p. (TL570 T64.84t Vis.)

Five circular probes, and one elliptical probe of tip width/tip height <1, were investigated. Boundary layer distortion due to the presence of a total pressure probe in the boundary layer is a function of both its tip width to tip height ratio and its tip height to boundary layer thickness ratio.

3853 Water Waves. The Mathematical Theory With Applications. J. J. Stoker. 567 p. 1957. Interscience Publishers, New York. (QA927 St67w)

An account of the mathematical theory of wave motion in liquids with a free surface and subjected to gravitational and other forces, together with applications to a wide variety of concrete physical problems.

See also: **3099** (high speed flow about cones); **3306** (intensity distribution in steam jets); **3895** (fluid flow in porous media); **4510** (turbulence in a superfluid).

FOOD TECHNOLOGY

3854* Factors Affecting Quality of Prepackaged Meat. II. Color Studies. Effects of Air and Oxygen Under Different Pressures Upon Color of Product. John A. Rikert, Lawrence Bressler, C. Olin Ball, and Elizabeth F. Stier. *Food Technology*, v. 11, Dec. 1957, p. 625-632.

3855* Application of Specific-Gravity Techniques for the Evaluation of Quality of Sweet Corn. Thomas M. Crawford and Wilbur A. Gould. *Food Technology*, v. 11, Dec. 1957, p. 642-647.

Of the specific-gravity techniques studied, the 6-lb method is recommended for fresh cut corn because of its simplicity of operation, inexpensive equipment and large sample size; the 100-g. method is recommended for canned and frozen whole kernel corn.

3856* Radiation Sterilization of Apple Slices. R. A. Gillies, et al. *Food Technology*, v. 11, Dec. 1957, p. 648-651.

The best over-all procedure is to use mature apples, process immediately after harvest, blanch in dilute sugar solutions, vacuum seal, freeze, and irradiate at 0.5 megarep.

3857* Trihydroxybutyrophenone—A Food Grade Antioxidant. Ben N. Stuckey and W. M. Gearhart. *Food Technology*, v. 11, Dec. 1957, p. 676-679.

Antioxidant produces initial stability equal to propyl gallate but has little or no carry-through properties in baked goods. It is extremely active in vitamin A, yellow grease, and paraffin wax.

3858 Preliminary Design Study of a Food Irradiation Reactor. D. T. Bray, et al. *Internuclear Company, Inc. (U. S. Atomic Energy Commission)*, AECU-3320, July 1956, 92 p. (UF767 Un3au Contin.)

Engineering description; nuclear considerations; effects of specifications and design parameters on reactor power; utilization of γ-radiation from radiator; reactor safety; data on $In_2(SO_4)_3$; major research and development problems.

3859 Irradiation Preservation of Milk and Milk Products. John H. Wertheim, Rathindra N. Roychoudhury, Johan Hoff, Samuel A. Goldblith, and Bernard E. Proctor. *Journal of Agricultural and Food Chemistry*, v. 5, Dec. 1957, p. 944-950.

A method was developed which increased the volatility of the off-flavor complex, or its precursors, of irradiated milk so that milk irradiated with 2×10^6 rep of γ-rays was obtained free from detectable off-flavors.

3860* Relative Roles of Niacin and Tryptophan in Maintaining Blood Pyridine Nucleotides, Nitrogen Balance and Growth in Adult Rats. M. M. Chaloupka, J. N. Williams, Jr., May S. Reynolds, and C. A. Elvehjem. *Journal of Nutrition*, v. 63, Nov. 1957, p. 361-375.

See also: **3275** (freeze-drying of materials); **3370** (analysis of bread and rolls); **3964** (Al in packaging).

FUELS AND COMBUSTION

3861* (German.) The Structure of Coal. **Beitrag zur Kenntnis der Steinkohlenstruktur.** L. Herédy, V. Neuberger, and V. Róna. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 12, no. 1, 1957, p. 35-56.

Structural changes during carbonification were followed up by the changes in the parameters of the presumed molecule serving as reference unit. Statistical chemical structure.

3862* (French.) Data on the Infra-Red Spectra of Coal. **Quelques donnees sur les spectres infrarouges des houilles.** G. Bergmann, G. Huck, J. Karweil, and H. Luther. *Annales des Mines de Belgique*, 1957, no. 10, Oct., p. 975-978.

Treatment of the coal to be examined by the method of Stimson and Schiedt. Comparison with the older suspension technique in Nujol. Study of the spectra of carbonized and oxidized coals and of their structure.

3863* (French.) Physical and Chemical Properties of the Elementary Constituents of Coal. **Sur les proprietes physiques et chimiques des constituants elementaires des charbons.** C. Kroeger. *Annales des Mines de Belqique*, 1957, no. 10, Oct., p. 984-986.

A study of vitrinite, exinite, and micrinite extracted from coal with 19 to 30% volatile matter. Specific volume determined with methanol; yield of heavy hydrocarbons and methane; H content; compressibility; aromatization. Chemical structure.

3864* (Dutch.) Checking Boiler Losses. **Bewaking van ketelverliezen.** L. H. le Poole. *Bedrijf en Techniek*, v. 12, no. 292, Nov. 16, 1957, p. 812 + 7 pages.

Perceptible heat from flue gases. Effect of incompletely burned gases, presence of cinders and inflammable elements. Radiation and conduction at the outside boiler surface.

3865* Latest Developments in Flame Failure Protection. I. *British Chemical Engineering*, v. 2, Dec. 1957, p. 654-661.

Reviews the types of flame-protection devices at present available, their virtues and inherent weaknesses, and how each type may be best employed.

3866* (Spanish.) Determination of the Calorific Value of Solid Fuels. **Determinación del poder calorífico de los combustibles sólidos.** *Combustibles*, v. 17, no. 92, July-Aug. 1957, p. 254-258.

Bomb calorimetry is used for measurements on coal.

3867* (French.) The Effect of Degasification on the Speed of Combustion of Artificial Graphites. **Influence du dégazage sur la vitesse de combustion de graphites artificiels.** Lucien Bonnetain, Xavier Duval, and Maurice Letort. *Comptes Rendus*, v. 245, no. 20, Nov. 13, 1957, p. 1728-1730.

The rate of combustion of artificial graphite was considerably increased as shown by the highly sensitive method used. This was due, it seems, to the very reactive carbon atoms left on the graphite by degasification.

3868 Jet Burner Design for Pressure Efficiency, Using Air Blast Injection. W. E. Francis and B. Jackson. *Gas Council, Research Communication* GC44, Nov. 1957, 51 p. (TP700 G21.2r Vis.)

Calculation of pressure efficiencies; burner design procedures.

3869* (German.) The Manufacture of Synthesis Gas in Vertical Chamber Ovens That Are Run Continuously. **Die Erzeugung von Synthesegas in stetig betriebenen Vertikalkammeröfen.** Wilhelm Fitz. *Gas- und Wasserfach*, v. 98, Ausgabe Gas, no. 47, Nov. 22, 1957, p. 1178-1183.

Japanese coal is distilled to synthesis gas in a vertical-chamber oven. Roughly 1100 tons of synthesis ammonia, calculated as ammonium sulfate, have been produced in this equipment.

3870 The Use of Light Petroleum Distillate for Gas Making. E. R. Ward. *Institution of Gas Engineers, Copyright Publication No.* 515, 1957, 15 p. (TP700 In7.3c Vis.)

A carbureted water gas plant experiment showed that the light distillate could be reformed successfully to produce a gas of a calorific value just below 400 B.T.U. per cu. ft., and that further quantities could be added to the carburetor to enrich to 500 B.T.U. per cu. ft.

3871 The Kinetics of Coal Carbonization. D. Fitzgerald. *Institution of Gas Engineers, Copyright Publication No.* 516, 1957, 42 p. (TP700 In7.3c Vis.)

As opposed to earlier studies in which the change in weight is used as a parameter for following the reaction, the method adopted here is the determination of the flow rate of each of the gases concerned under vacuum at rising temperature.

3872* (Russian.) The Effect of Hydrocarbon Additions on the Spreading-Limit Concentration of Flame in Gas Mixtures Containing Hydrogen. **Vozdeistvie dobavok uglevodorodov na kontsentratsionnye predely rasprostraneniia plameni gazovykh smesiakh, soderzhashchikh vodorod.** E. A. Bliumberg, V. I. Vasil'ev, and N. M. Emanuel'. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1957, no. 10, Oct., p. 1172-1180.

Spreading limits of flames in mixtures of H with air using additions of methane, propane, *n*-butane, isobutane, and benzene, and in mixtures of H_2Cl_2, and H_2+NO in the presence of propane, as well as in mixtures of air with methane, propane, *n*-butane, and benzene.

3873 Studies in a New Type of Flat Flame Burner. William T. Biedler and H. E. Hoelscher. *Jet Propulsion*, v. 27, Dec. 1957, p. 1257-1260.

This new device for measuring flame velocities is a burner utilizing a stable planar flame front which permits the study of stable flat flames, free from contact with any surface.

3874 Influence of Hydrogen and Deuterium on Flame Velocities of Dry Carbon Monoxide-Oxygen Mixtures. Leland A. Watermeier. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1118-1126.

A constant pressure method employing a schlieren photographic technique was used to determine the space velocities of dry CO-O mixtures with added H and D. Flame velocities were obtained by using the data together with theoretical expansion ratios.

3875 Studies on Combustion of Pulverized Coal. I. Physico-Chemical Aspects. B. Ghosh. **II. Combustion Within a Furnace.** N. K. Ray, D. Basu, and B. Ghosh. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 464-474.

Physico-chemical aspects with reference to the formation of stable flames. Influence of nature of coal, particle size, and coal-to-air ratio on the combustion process.

3876* (Czech.) Use of Substitute Binders in Coal Dust Briquetting. **Pojení černouhelného prachu náhradními pojidly.** V. Nývlt. *Paliva*, v. 37, no. 11, Nov. 1957, p. 375-380.

Waste materials are substituted for coal-tar pitch as binding agents. Up to 25% of the pitch can be replaced while maintaining existing technology of the briquet plants. Use of viscose as a binding material. Properties of briquets bound with simple and combined binding materials.

3877* (Czech.) Determination of Water of Hydration in Coal. **Příspěvek ke stanovení hydrátové vody v černém uhlí.** J. Šindelář. *Paliva*, v. 37, no. 11, Nov. 1957, p. 381-384.

Analysis of hydrate water in coal from the viewpoint of present theory on the character of water bound in inorganic materials. Critical evaluation of existing methods of determination of hydrate water. Results of extensive experimental work show that the hydrate water carriers in coal are clay minerals of the kaolinite and mica-slate groups.

3878* (Polish.) Possibility of Using Hydrogen From Coke Gas in the Pressure Hydrogenation Processes. **O możliwości zastosowania wodoru z gazu koksowniczego do procesów uwodorniania ciśnieniowego.** I. Borecka. *Przemysł Chemiczny*, v. 13, no. 10, Oct. 1957, p. 609-611.

The possibility of applying purified H obtained from coke oven gas in pressure hydrogenation process is examined. A method of purifying H from the gas is given.

3879 (French.) Contribution to the Study of the Combustion of Saturated Hydrocarbons at Low Temperatures. **Contribution a l'étude de la combustion des hydrocarbures saturés a basse température.** M. Lucquin. *Revue de l'Institut Français du Pétrole et Annales des Combustibles Liquides*, v. 12, no. 10, Oct. 1957, p. 1079-1119.

Studies of combustion of pentane and other hydrocarbons in oxygen at 200 to 500 C. (To be continued.)

3880* (Norwegian.) Oil Heating in Small Central Plants. **Oljefyring i mindre sentralvarmeanlegg.** A. Watzinger and Hans Goksoyr. *Teknisk Ukeblad*, v. 104, no. 42, Nov. 14, 1957, p. 931-938.

Testing two types of burners. With the pressure atomization burner a high flue gas loss occurred because of the relatively high amount of oil and low CO_2 content. The evaporation burner was better at normal operation but less efficient with low charges.

3881* (Russian.) Thermal Effect of Sweeping of Boiler Furnace Walls With a Pulverized Fuel. **Teplovoi effekt obduvki ekranov pri szhiganii pylevidnogo topliva.** A. M. Gurvich and G. E. Ozhigov. *Teploenergetika*, v. 4, no. 12, Dec. 1957, p. 9-13.

Evaluation of soot-blowing devices for increase of heat-absorbing-surface efficiency.

3882 Field-Scale Experiments in Underground Gasification of Coal at Gorgas, Ala. Use of Electrolinking-Carbonization as a Means of Site Preparation. James L. Elder, et al. *U. S. Bureau of Mines, Report of Investigations* 5367, Oct. 1957, 101 p. (TN21 Un3r Vis.)

Field-scale experiments from 1951 to 1954 using electrode spacings of 150, 152, and 155 ft. and gasified with air, O, and steam or in various combinations.

See also: **3281** (production of town gas from methanol and a petroleum distillate); **3539** (thermal conductivity of propane); **3588** (burning of pulverized or atomized fuels); **4036** (corrosion in boiler furnaces); **4054** (blast-furnace tuyere combustion zone); **4280** (leak detector for gas pipelines); **4425** (flammability of hydrogen).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

3883* (English.) **Correlation Between the Crystal Structure of Dolomite and Its Suitability for Magnesium Recovery.** T. G. Gedeon. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 339-348.

Investigation of the physical structure of dolomite by the Debye-Scherrer X-ray method gave no appreciable differences between the several grades. Thermal decomposition curves gave characteristic divergences between the individual kinds of dolomite.

3884* (Russian.) Increasing the Sensitivity of Radiotelescopes. **O povyshenii chuvstvitelnosti radioteleskopov.** G. M. Tovmasian. *Akademiia Nauk Armianskoi SSR, Doklady*, v. 25, no. 3, 1957, p. 107-115.

Increases sensitivity by concentrating weak radiation.

3885* The Thermo-Nuclear Experiment and Its After Effects on the Atmosphere and the Ocean. *American Meteorological Society, Bulletin*, v. 38, Oct. 1957, p. 453-459.

Brief review of research by Japanese specialists, covering experiments since 1954.

3886 Absorption Spectra of Some Silicates in the Visible and Near Infrared. Sydney P. Clark, Jr. *American Mineralogist*, v. 42, Nov.-Dec. 1957, p. 732-742.

Absorption coefficients of olivine, diopside, and three varieties of garnet have been measured in the spectral range from 0.3 to 4 μ.

3887 Some Free Energy Values From Geologic Relations. R. M. Garrels. *American Mineralogist*, v. 42, Nov.-Dec. 1957, p. 780-791.

From a study of weathering processes, standard free energies of formation from the elements at 25 C and one atm. total pressure were estimated for kaolinite (-883 kcal.), muscovite (-1298 kcal.), and K-feldspar (-856 kcal.).

3888* (English.) **Annals of the International Geophysical Year. IGY Instruction Manual.** *Annals of the International Geophysical Year*, v. 5, pts. 1, 2, and 3, 1957, 244 p. + 11 plates.

Calculation of the vertical distribution of ozone by the Götz Umkehr-effect. Use of the ozone spectrophotometer. Auroral photography by all-sky camera. Antarctic radio communication manual.

3889* On the Application of the Method of Variation of Elliptic Orbit Elements in Case of a Satellite Vehicle. J. M. J. Kooy. *Astronautica Acta*, v. 3, no. 3, 1957, p. 179-214.

Determination of the six elliptical orbit elements of the instantaneous motion of an artificial earth satellite and of the application of the method of variation of orbit elements, if the influences of the oblateness of the earth and the atmospheric drag, as well as the solar and lunar disturbing force are taken into account.

3890 Engineering Hydrology. Stanley S. Butler. 356 p. 1957. Prentice-Hall, Englewood Cliffs, N. J. (GB661 B97e)

Covers the hydrologic cycle with emphasis on the runoff phase, and with a view to predicting flood flow and determining the quantity, frequency, and nature of occurrence of water yield, both surface and underground.

3891 Volume Requirements for Air or Gas Drilling. R. R. Angel. *Journal of Petroleum Technology*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 210, Dec. 1957, p. 325-330.

A vertical-flow equation is presented, which includes the effect of the solids that are transported up the annulus in the flow stream by incorporating the drilling rate as one of the parameters. The effect of down-hole temperature on required circulation rates is also analyzed.

3892* Measurement and Distribution of Zircons in Some Granitic Rocks of Magmatic Origin. Leonard H. Larsen and Arie Poldervaart. *Mineralogical Magazine and Journal of the Mineralogical Society*, v. 31, Sept. 1957, p. 544-564.

Graphic methods of representing zircon data; laboratory procedures used in preparing zircon concentrates; distribution of zircons in the mineral fabric of a tonalite and in a magmatic pluton.

3893* (German.) The Anomalous Frequencies of Elements in the Cosmos. **Anomale Elementhäufigkeiten im Kosmos.** H. H. Voigt. *Naturwissenschaften*, v. 44, no. 19, Oct. 1957. p. 501-504.

Normal element frequency. Deviations. Solidified heavenly bodies. The two stellar populations. Cold, Wolf-Rayet, metallic, and helium stars. Unstable elements.

3894* Sulphur Isotopic Variations in Nature. II. A Quantitative Study of the Reduction of Barium Sulphate by Graphite for Recovery of Sulphide-Sulphur for Sulphur Isotopic Measurements. II. A Study of the Combustion Characteristics of Silver Sulphide and Lead Sulphide for Sulphur Isotopic Measurements. T. A. Rafter. *New Zealand Journal of Science and Technology*, v. 38, sec. B, no. 9, Nov. 1957, p. 955-981.

3895 New Technique for Study of Fluid Flow and Phase Distribution in Porous Media. O. K. Kimbler and B. H. Caudle. *Oil and Gas Journal*, v. 55, Dec. 16, 1957, p. 85-88.

A photographic technique was developed to observe fluid displacement over large areas of porous media while at the same time detailing the individual pore spaces.

3896 The Planet Earth. 168 p. 1957. Simon and Schuster, New York. (QC806 Sci27p)

A comprehensive picture of current knowledge about the earth's interior and crust, its waters, atmosphere, and nearby cosmic environment.

3897* Some Wettability Characteristics of Synthetic Porous Media. W. A. Gatenby and S. S. Marsden. *Producers Monthly*, v. 22, Nov. 1957, p. 5 + 6 pages.

Capillary pressure curves; pore volume determination; imbibition tests.

3898* Brine and Fresh Water Permeabilities of a Water-Sensitive Sand. Alan F. Griffith and Donald E. Menzie. *Producers Monthly*, v. 22, Nov. 1957, p 27-31.

3899 Prospecting for Uranium. Rev. Ed. 217 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (TN270 Un3p)

A revision of the 1951 publication covering field operations, laws, and regulations.

3900* (French.) The Mechanical Properties of Mineral Beds. **Les propriétés mécaniques des bancs.** H. Labasse. *Revue de l'Industrie Minérale*, v. 39, no. 11, Nov. 1957, p. 996-1002.

Importance of the study of beds because of the constant deformation of the grounds. Geometrical continuity and effects of the fissures on the bed properties. Resistance to pressure and flexing in continuous beds.

3901* (French.) The Use of Explosives in Mines. **Emploi des explosifs en carrière.** M. H. Malan. *Revue de l'Industrie Minérale*, v. 39, no. 11, Nov. 1957, p. 1013-1024.

Mechanism of the explosion and its application. Deep mining process. Selecting the explosive, calculation of the charges, location, priming and safety.

3902 Observations of Satellite I. Fred L. Whipple and J. Allen Hynek. *Scientific American*, v. 197, Dec. 1957, p. 37-43.

An account of how the first satellite's orbit was determined, and how our knowledge of this orbit can be applied.

3903* (German.) The Solidification of Sedimentary Formations. **Von der Verfestigung sedimentärer Bildungen.** F. Schwarz. *Silikattechnik*, v. 8, no. 10, Oct. 1957, p. 418-422.

The ionogen water bond is emphasized to be the cause of the solidification. The relations prevailing between gel minerals, mortars and concretes with regard to the concentration of hydrogen ions, ion radii, and coordination are discussed.

3904 Size and Shape of the Earth. W. A. Heiskanen, editor. 107 p. 1957. Institute of Geodesy, Photogrammetry and Cartography of the Ohio State University, Columbus. (QB280 H36s)

A symposium at Ohio State University on Nov. 1956. Covers classic and modern arc measuring methods; celestial and gravimetric methods; world gravimetric and geodetic system.

3905 Preparation of Mutually Consistent Magnetic Charts. P. Fougere and J. McClay. *U. S. Air Force, Cambridge Research Center, Geophysical Research Paper No.* 55, June 1957, 39 p. (TK7800 Un3.12b Contin.)

Development of an analytic method for preparing magnetic charts of the earth.

3906 The Universe. 142 p. 1957. Simon and Schuster, New York. (QB981 Sci27u)

Six articles telling of current investigations, both observational and theoretical, into the make-up and history of galaxies and the age and extent of the visible universe as a whole.

3907* (German.) A Contribution to the Adsorption Theory of Exomorphosis. **Zur adsorptionstheorie der Exomorphose.** W. Kleber. *Zeitschrift für Kristallographie*, v. 109, no. 2, Oct. 1957, p. 115-128.

Consideration of Hartman and Perdok's theory has lead to a generalization of habit variation in crystals. The results achieved can be applied to the operation of solvation.

3908* (German.) Uranium Content of the Stone Meteorites and Their Age. **Über den Urangehalt der Steinmeteorite und deren "Alter".** F. Hernegger and H. Wänke. *Zeitschrift für Naturforschung*, v. 12a, no. 10, Oct. 1957, p. 759-762.

Determination of the U content of three chondrites by neutron activation analysis; around 1 x 10^{-8} g U/g. Concentration of Ba: 3.5 x 10^{-6} g Ba/g. Age of two meteorites by the He method: 3.6 to 3.8 x 10^{9} yrs.

3909* (German.) A New Method for the Determination of Very Small Quantities of Uranium and Its Application to the Uranium Analysis of Stone Meteorites. **Eine neue Methode zur Bestimmung kleinster Uranmengen und ihre Anwendung auf die Urananalyse von Steinmeteoriten.** K. H. Ebert, H. König, and H. Wänke. *Zeitschrift für Naturforschung*, v. 12a, no. 10, Oct. 1957, p. 763-765.

A method for the measurement of Xe^{133}. Reconditioning of the radiated specimens. Three chondrites were tested for their U content.

3910* (German.) Effect of Cosmic-Ray Radiation on Iron Meteorites. **Über die Einwirkung der Höhenstrahlung auf Eisenmeteorite.** K. H. Ebert and H. Wänke. *Zeitschrift für Naturforschung*, v. 12a, no. 10, Oct. 1957, p. 766-773.

Determination of the He and Ne content in a series of Fe meteorites. Both were the products of reaction of cosmic-ray radiation with the atomic nuclei of the meteorites. Calculation of the loss of mass through the atmosphere, that is, 78%.

See also: **3228** (cation-exchange capacity of bentonite); **3762** (radio wave scattering by atmospheric turbulence).

GRAPHIC ARTS

3911 Variable Delay Spark Illumination for Single Shot High Speed Photography. G. Hodgson. *Electronic Engineering*, v. 29, Dec. 1957, p. 608-610.

Method of taking a series of high quality photographs of a reproducible phenomenon by delaying the illuminating spark by a known controllable length. Delay is variable from 100μ sec. to 1 sec. after the object has interrupted a light beam.

3912* (German.) Photoreproduction and the Slide Rule. **Reproduktionsphotograph und Rechenschieber.** Joel Läderach. *Fachhefte für die Chemigraphie, Lithographie und den Tiefdruck*, 1957, no. 3, Aug., p. 217-224.

Use of the slide rule for calculating all necessary data for photoreproduction.

3913* (French.) Precautions Concerning the Blocks in Printing. **Précautions a prendre au sujet des clichés.** Louis Durand. *France Graphique*, 1957, no. 131, Nov., p. 15 + 2 pages.

Causes of defective blocks and remedies. Preparation of the form and metal quoins. Holes, storing methods, over-inking half tone blocks, and causes of wear.

3914 What the Lithographer Should Know About Paper. Technical Bulletin No. 8. Robert F. Reed. 160 p. 1957. Lithographic Technical Foundation, Inc., New York. (NE2425 L71w)

Manufacture and properties of paper; requirements for printability of offset paper; paper properties vs. print quality; handling paper in the mill and pressroom; air-conditioning; lithographic paper troubles and their prevention; testing.

3915 Printing and Litho Inks. Herbert Jay Wolfe. 5th Rev. Ed. 489 p. 1957. MacNair-Dorland Co., New York. (TP949 W83p5)

History and general characteristics of inks. Vehicles; solvents; pigments; driers and drying; addition agents. Types of inks. Physics of printing inks. Factory equipment; testing; ink troubles and remedies.

HEAT POWER

3916* Does Fouling of Heat-Exchanger Surfaces Always Mean Poorer Performance? *British Chemical Engineering*, v. 2, Dec. 1957, p. 674-676.

Discusses the above position. The conditions under which the reverse is the case are outlined for fouling inside exchanger tubes and on the plates of plate exchangers.

3917* (English.) **Hydraulic Analog for the Study of Heat Exchangers. II. Analog With a Capillary of Variable Conductance for a Countercurrent Heat Exchanger.** J. Procházka, J. Landau, and G. Standart. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1343-1352.

Relations for determining the dimensions of the various parts of a hydraulic analog of a countercurrent heat exchanger. Construction, properties, and calibration of a capillary with a variable conductance.

3918* (Czech.) Installations for Utilization of Waste Heat From Steel Furnaces. **Zařízení k využití odpadního tepla ocelářských pecí.** Miroslav Krőhn. *Hutník*, v. 7, no. 11, Nov. 1957, p. 375-381.

Waste-heat boilers, their construction, technical details, and operation. Cooling equipment and its connection into a waste-heat-boiler system.

3919 Spectrometric Investigations of *n*-Heptane Preflame Reactions in a Motored Engine. K. J. Pipenberg and A. J. Pahnke. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 2067-2072.

A versatile spectrometer geared to a single-cylinder engine was used to study the reactions responsible for the cool, blue, and intense blue flames obtained in an engine combustion chamber under increasingly severe operating conditions.

3920 The Application of Automatic Digital-Data-Collecting to Boiler Testing. J. H. Bail, C. E. Jones, H. T. Hoffman, and W. T. Hage. *Mechanical Engineering*, v. 79, Nov. 1957, p. 1016-1021.

The DATAK system of centralized computer analysis of field data is explained.

3921* (French.) Protection of the Materials Used for Jet Motors Subjected to Combustion Instability. **Moyens de protection des matériaux pour moteurs à réaction fonctionnant en combustion instable.** B. Langenecker. *Métaux, Corrosion-Industries*, v. 32, no. 385, Sept. 1957, p. 343-351.

A study of combustion instability as an obstacle to the safe operation of jet motors. Surface destruction by oscillating cavitation in liquid propellants; catalytic effect of the crystals produced; ductility of metals affected by low and average frequencies. Means used against combustion instability.

3922 (Czech.) Flow Conditions in an Axial Turbine Stage With Relatively Long Blades. **Řešení axiálního turbinového stupně s relativně dlouhou lopatkou.** J. Nevole and M. Kousal. *Strojírenství*, v. 7, no. 11, Nov. 1957, p. 805-810.

A new method of calculation based on assuming straight flow surfaces in conical stages. Illustration of theoretical conclusions by an example.

3923 Theoretical Rocket Performance of JP-4 Fuel With Several Fluorine-Oxygen Mixtures Assuming Frozen Composition. Sanford Gordon and Kenneth S. Dresllishak. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E57G16a, Nov. 1957, 62 p. (TL782 Un3m Vis.)

3924 Investigation of a Wide Angle Diffuser With Air Augmentation for Use as a Jet Muffler. A. J. Campbell. *University of Toronto, Institute of Aerophysics, UTIA Technical Note No.* 15, Aug. 1957, 20 p. (TL570 T64.84t Vis.)

Wide angle diffusers which use resistance to prevent separation can be made to perform satisfactorily on a system with air augmentation. The results achieved suggest that the configuration has potential for development into a successful jet muffler.

See also: **3305** (water deoxygenation); **3306** (intensity distribution in steam jets); **3496** (steam tables); **3864** (boiler heat losses); **3998** (thermal stress analysis); **4024** (corrosion by HNO_3 rocket fuel); **4315** (liquid metal fuel reactor); **4421** (description of Shippingport power station).

INFORMATION—PREPARATION AND DISSEMINATION

3925 Documentation and Information Retrieval. J. W. Perry and Allen Kent. 156 p. 1957. Western Reserve University Press, Cleveland. (Z695.92 P42d)

Recent difficulties in making efficient use of recorded knowledge have resulted in much time and effort being devoted to development of new methods and techniques for classification. Discusses a possible general theory of documentation in engineering terms.

3926* Some Reflections on the Problems of Student and Teacher in College Engineering Studies. H. E. M. Barlow. *Institution of Electrical Engineers, Journal*, v. 3, no. 36, Dec. 1957, p. 644-647.

A practical and stimulating report on classroom communication detailing the responsibilities of both student and teacher.

3927 Interpretation of Recent Events in the Automation Field. Richard Rimbach. *Instruments and Automation*, v. 30, Dec. 1957, p. 2255-2259.

Lists emergence of trade journals, technical societies, meetings, and exhibitions, particularly those of the past 30 yrs.

See also: **3675** (computer for language translation).

INSTRUMENTATION

3928 Determination of Aerosol Size Distributions by Jet Impactor-Light Scattering Technique. Joseph K. Thompson. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1847-1850.

Determination by using single jet impactors together with a light scattering meter.

3929 A Simple Calibration Technique for Improving the Accuracy of a Smith Resistance Thermometry Bridge. G. C. Lowenthal. *British Journal of Applied Physics*, v. 8, Nov. 1957, p. 449-452.

An analysis shows, that provided certain conditions are satisfied, an external decade of stable 10Ω resistors can be used to reduce the errors to ± 0.005 and ± 0.001 C respectively, since the calibration is sufficiently simple and quick to be repeated as required.

3930* Chromatography in the Plant—From Monitoring to Control. *Canadian Chemical Processing*, v. 41, Dec. 1957, p. 108-110.

A valuable new monitoring instrument, the gas chromatograph, may be a process controller of the future.

3931 A Flow Colorimeter for Measuring Uranium Concentration in Process Streams. Charles A. Prohaska. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-229, Aug. 1957, 20 p. (UF767 Un3.1dp Contin.)

A meter for aqueous or organic streams.

3932 Sampler for Powdered Material. William R. Kennedy, Jr. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-231, Aug. 1957, 8 p. (UF767 Un3.1dp Contin.)

Automatic mechanism obtains a representative sample of free-flowing powdered material dropping down a vertical pipe. Device embodies the principle of an oscillating slotted "shutter" which momentarily admits a small increment of process material to a collecting vessel.

3933 Vibration Measurements Employing $BaTiO_3$ Accelerometers. Jens T. Broch. *Electronic Engineering*, v. 29, Dec. 1957, p. 575-579.

Piezo-electric ceramics open new possibilities in miniaturizing mechanical-electrical transducers, thereby reducing the "back effect" of the transducer upon the test-object, and making measurements possible in places where space is limited.

3934 Spot Scanner Counts Micron-Sized Particles. H. P. Mansberg, Y. Yamagami, and C. Berkley. *Electronics*, v. 30, Dec. 1, 1957, p. 142-146.

Moving target indicator spots and counts bacteria colonies randomly distributed over a flat surface. Spot signals from particles less than 100μ in diameter are received from cathode ray tube and stored in a 1,000μ sec. delay line. Viedo circuit compensates for spot-to-background density and an anticoincidence circuit determines the correct count delivered to a high-speed recorder.

3935 Measurement of Natural Frequency. Alvin B. Kaufman. *Instruments and Automation*, v. 30, Dec. 1957, p. 2266-2269.

Determination of frequency and degree of damping in structures, accelerometers, and electrical elements. Method is applicable both above and below a damping factor of 0.6.

3936 Measurement of the Specific Surface Area of Fine Powders. A Comparison of the "Gas-Adsorption" and "Air-Permeability" Methods. D. H. Mathews. *Journal of Applied Chemistry*, v. 7, pt. 2, Nov. 1957, p. 610-613.

3937 Particle Size and Particle Size Distribution of Pigments by Small-Angle X-Ray Scattering. William J. Marculaitis. *Journal of Colloid Science*, v. 12, Dec. 1957, p. 581-593.

A commercial X-ray diffraction unit is adapted to give small-angle X-ray scattering measurements in pigment systems; X-ray scattering curves for the dry pigments correlate with other methods.

3938 Particle Size Analyses of a Metal Powder Using a Turbidimeter. A. Duffield and H. Heywood. *Imperial College Chemical Engineering Society, Journal*, v. 10, 1956, p. 13-19. (TP1 Im7j Vis.)

The intensity of the parallel light beam penetrating a suspension of the powder sample sedimenting in the tank is used as an indication of the relative surface of the particles in suspension at a fixed depth with varying times of settlement. This intensity is measured by a photoelectric cell operating a mirror galvanometer and recording a continuous trace on photographic paper. Viscous liquids are required in order to retard the sedimentation times with high-density metallic powder.

3939 Measuring With the Electron. L. Marton. *Journal of Scientific & Industrial Research*, v. 16, sec. A, Oct. 1957, p. 429-439.

The property of interaction with matter and with fields of force, similar to the interactions of light, makes the electron an excellent medium for conveying information in a measuring process.

3940 A Contour Generator for X-Ray Crystal Structure Analysis. S. Krishnan. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 432-435.

An electronic device was developed for the presentation of a two-dimensional function as a contour map on the screen of a cathode ray oscillograph, to be used in conjunction with an analogue computer for X-ray crystal structure analysis.

3941 A High-Precision Photoelectric Polarimeter. E. J. Gillham. *Journal of Scientific Instruments*, v. 34, Nov. 1957, p. 435-439.

In this instrument, designed primarily for standardization work on quartz control plates, the half-shade principle familiar in visual polarimeters is realized, in a slightly different form, by means of a revolving disk carrying segments of optically-active quartz.

3942 Some Improvements in the Operation of the Optical Diffractometer. C. A. Taylor and B. J. Thompson. *Journal of Scientific Instruments*, v. 34, Nov. 1957, p. 439-447.

A systematic method of adjusting the components to bring their optical axes into coincidence is described, followed by an account of a theoretical study of the variation of partial coherence which leads to the formulation of a set of practical rules for choosing the correct size of pinhole for a particular problem.

3943* (Russian.) Classification of Low-Temperature Induction Heaters. **Klassifikatsiia nizkotemperaturnykh induktsionnykh nagrevatelei.** D. D. Dobriakov. *Latvijas PSR Zinātnu Akademija, Vestis*, 1957, no. 9, p. 115-124.

Attempts to classify application of low-temperature induction heaters (regradless of their structure), according to their electro-magnetic system.

3944* (English.) **Experimental and Theoretical Investigations on the Oscillating Cylinder Viscometer for Non-Elastic Liquids.** Ali Obdel Kerim Ibrahim and Abdel Monem I. Kabiel. *Physical Society of Japan, Journal*, v. 12, Nov. 1957, p. 1304-1311.

Experiments on paraffin, pump, and castor oils, shell motor oils X-100-60, X-100-50, and X-100-40, and glycerine.

3945* Development of a Reference Electrode and Procedure of Measuring pH at High Temperature and High Pressure. Otto V. Ingruber. *Pulp and Paper Magazine of Canada*, v. 58, Dec. 1957, p. 131-137.

Reference electrode performs in a reproducible and reversible manner up to the tentative limits of 200 C and 200 psi.g.

3946* (German.) Characteristics of Metal Bellows. **Eigenschaften von Metallbälgen.** H. Nothdurft. *Regelungstechnik*, v. 5, no. 10, 1957, p. 334-338.

Measurements of bellows properties are described, and the results of experiments are stated in the form of approximate equations.

3947 Barium Absorption Pumps for High-Vacuum Systems. Robert W. Cloud, Lars Beckman, and John G. Trump. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 889-892.

Pump combines large areas of evaporated Ba with a source of ionization. It is capable of maintaining high vacuum in unout-gassed sealed-off systems even in the presence of organic sealing materials.

3948 Method for Determining Thermal Conductivity at High Temperatures. C. L. Longmire. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 904-906.

Method involves measuring temperatures at the center of the faces of a rectangular rod which is heated electrically. Radiation of energy causes a difference in the temperatures of the short and long faces, and this difference is related to the thermal conductivity.

3949 Continuous-Recording Laboratory Thermobalance. E. S. Bartlett and D. N. Williams. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 919-921.

Instruments for continuous, automatic recording of weight change in laboratory tests was constructed. Sensitivity and accuracy permit transcription of weight change rates from 3 to 70 mg. per min. Suggestions for instrument design for measurement of oxidation rates in the order of 0.1 mg. per hr. are presented.

3950 Portable Liquid Density Instrument Employing Transistors. C. W. Hargens. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 921-923.

Instrument derives its sensitivity from a miniature differential transformer and associated transistor electronics.

3951 Rotation Viscometer Directly Measuring the Ratio of the Shearing Stress to the Rate of Shear. H. Eisenberg. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 927-929.

3952* A Load Cell Using Unbonded Resistance-Wire Strain Gauges. G. H. Laycock. *Society of Instrument Technology, Transactions*, v. 9, Dec. 1957, p. 112-123.

Load cells of this type can be designed for maximum loads of from ½ ton to more than 100 tons. The strained post is in the form of a vertical cylinder of high-tensile steel hollowed along its axis for one quarter of its length at each end. Strain-gage wire is wound in tension round the post into four helical coils each with its end secured, thus eliminating slip.

3953* Some Uses of Radio-Isotopes in Process Control and Instrumentation. H. A. Tapsfield. *Society of Instrument Technology, Transactions*, v. 9, Dec. 1957, p. 131-138.

Essential characteristics of the radiation from radioactive substances. Commercially produced instruments for detecting β- and α-radiation. Industrial applications.

3954* (Russian.) Calculations for a Radiation Bolometer. **Raschet radiatsionnogo bolometra.** M. I. Kornfel'd. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2652-2661.

Calculation schemes and comparative evaluation methods for their design.

See also: **3105** (navigation instruments); **3273** (low temperature distillation); **3396** (analytical chemistry microscopy); **3838** (liquid interface level measurement).

LUBRICATION AND FRICTION

3955* (German.) Investigation Into Winding and Friction Phenomena Related to Shafts and Other Rotating Machine Parts. **Wickel- und Reibungsuntersuchungen an Wellen und anderen umlaufenden Maschinenteilen.** Franz Wieneke. *Forschung auf dem Gebiete des Ingenieurwesens*, v. 23, Ausgabe B, *VDI-Forschungsheft* 463, 1957, 28 p.

A theoretical and experimental study for explaining the behavior of rotating machine parts. Friction factors, comprising the influences exerted by the diameter and the superficial structure of the shaft, its circumferential speed, entity of the goods, time of friction, surface pressure, and influence of water, oil, or fat were used for determining the tendency of winding.

3956 The Effect of Lubricant Inertia in Journal-Bearing Lubrication. J. F. Osterle, Y. T. Chou, and E. A. Saibel. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 494-496.

The Reynolds equation of hydrodynamic theory, modified to take lubricant inertia into approximate account, is applied to the steady-state operation of journal bearings to determine the effect of lubricant inertia on the pressure developed in the lubricant.

3957 Ground Rules for Determining or Comparing Bearing Capacity Ratings. Leo Fiderer. *Machine Design*, v. 29, Dec. 12, 1957, p. 133-142.

What they are; how they are determined; their use in bearing selection.

3958 Coefficients of Flat-Surface Friction. A. O. Schmidt and E. J. Weiter. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1130-1136.

A study of the coefficients of static friction, as well as the "break-away" and kinetic behavior of selected material combinations. Effects of initial wear and time at rest.

3959* Lubrication of Aircraft Oscillating Control Bearings at High Temperatures. D. C. McGahey and R. S. Barnett. *NLGI Spokesman*, v. 23, no. 9, Dec. 1957, p. 14-27.

A tester simulating control bearing operation at high temperatures was operated successfully over a range from 350 to 550 F. Seals of special heat-resistant materials are required for use at the temperatures investigated. Certain of the lubricants and seals tested showed promise up to 550 F.

See also: **3944** (measurement of lubricant viscosity).

MECHANICAL ENGINEERING

3960* (English.) **A New Method of Recording Vibrations in the Foundation of Turbogenerators and in the Structure of Power Houses.** A. Major. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 295-316.

3961* (French.) Application of the Green Formula to the Numerical Analysis of Elastic Slabs. **Application de la formule de green à l'examen numérique des plaques élastiques.** K. Szmodits. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 383-391.

Numerical solution of problems of boundary values of the potential and of the bipotential equations; application of the suggested mathematical procedure to the analysis of elastic slabs.

3962* (French.) A Method for the Arithmetical Determination of Torsional Stresses. **Méthode de calcul numérique des contraintes causées par la torsion.** P. Csonka. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 399-407.

Shear stresses arising in a solid prismatic bar, submitted to pure torsion, are easily calculated, provided the angle of twist per unit length is known.

3963 The Impact of Bearing Clearances on Shaft Stability. J. Morris. *Aircraft Engineering*, v. 29, Dec. 1957, p. 382-383.

The treatment presented is concerned with conditions for steady circular motion of a shaft running in two bearings and carrying an overhung rotor.

3964 Aluminium in Packaging. *Aluminium Development Association*, Oct. 1957, 44 p. (TN775 AL81.7a Contin.)

Types of containers and packages. Aluminum packaging materials: their composition, properties, and available forms.

3965 Naval Architect's Problems With Ship Plate. D. P. Brown. *American Iron and Steel Institute, Preprint*, 1957, 22 p. (TS300 Am35ta Vis.)

Documents the present trend in specifications for ship structures.

3966* Cylinder Material—Steel or Aluminum? P. Person. *Applied Hydraulics*, v. 10, Dec. 1957, p. 111-114.

Weight, strength, high-temperature resistance, fatigue life as well as application must all be considered when choosing an aircraft cylinder material. Relative merits of the two most-commonly used materials are discussed.

3967* (Spanish.) The Effect of Welding on Metallic Structures. **La influencia de la soldadura en las construcciones metalics.** C. Penche Felgueroso. *Ciencia y Técnica de la Soldadura*, v. 7, no. 38, Sept.-Oct. 1957, 12 p.

Advantages of metallic structures in comparison with concrete. Study of simple isostatic, rigid, and semirigid structures; calculation and construction; applications.

3968 Design and Tests of Building Structures. 85. p. 1957. American Society for Testing Materials, Philadelphia. (TA419 Am35s)

Symposiums on building design for seismic and shock loading and developments in glued-laminated and other wood constructions.

3969 Hydraulically Driven Pumps. Donald H. Newhall. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1949-1954.

The importance of pumps in coming industrial high pressure demands.

3970 Strength of Cylinders. W. R. D. Manning. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1969-1978.

3971 Stress Concentration in Heavy-Walled Cylindrical Pressure Vessels. Effect of Elliptic and Circular Side Holes. J. H. Faupel and D. B. Harris. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1979-1986.

Establishes realistic stress concentration factors for side holes in cylinders.

3972 A New High Pressure Technique. The Controlled-Clearance Principle. Donald H. Newhall. *Industrial and Engineering Chemistry*, v. 49, Dec. 1957, p. 1993-1995.

This principle was developed to avoid troublesome leakage normally encountered when mechanical power is transmitted with a shaft or piston into a vessel at high pressure.

3973 A Photoelastic Study of Maximum Tensile Stresses in Simply Supported Short Beams Under Central Transverse Impact. A. A. Betser and M. M. Frocht. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 509-514.

Simply supported short Castolite beams of uniform rectangular cross section were subjected to central transverse impact by a heavy mass. Photoelastic streak photographs were taken of the transverse section of symmetry for a wide range of spans, widths, and impact velocities at exposures of less than 1μ sec.

3974 Nodal Patterns of the Free Flexural Vibrations of Stiffened Plates. W. H. Hoppmann, II and L. S. Magness. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 526-530.

3975 Symmetrical Buckling of a Series of Uniformly Loaded Parallel Struts Supported by Spot Connections to a Long Thin Plate. J. L. Cutcliffe and H. S. Heaps. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 531-536.

The critical load for buckling is found as a function of the elastic properties of plate and stiffeners for various spacings of the stiffeners, and the number of spot connections to the plate.

3976 Buckling of Rectangular Plates With Two Unsupported Edges. P. Shuleshko. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 537-540.

Considers the elastic stability of rectangular plates compressed in two perpendicular directions by forces uniformly distributed along the edges.

3977 Behavior of Cylinders With Initial Shell Deflection. M. E. Lunchick and R. D. Short, Jr. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 559-564.

Initial deflections of the shell of a stiffened cylinder were measured and found to be approximated closely by a second-degree curve. Using the mathematical expression for the initial deflection curve, a theoretical analysis was made for a cylinder subjected to external hydrostatic pressure, resulting in expressions for the additional deflections and stresses caused by the initial deflection.

3978 Stress Concentrations in a Strip Under Tension and Containing Two Pairs of Semicircular Notches Placed on the Edges of Symmetrically. A. Atsumi. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 565-573.

3979 Force in the Plane of Two Joined Semi-Infinite Plates. J. T. Frasier and Leif Rongved. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 582-584.

The stress due to a force parallel to the plane of two joined semi-infinite plates is obtained from the three-dimensional state of stress produced by a force operative at a point interior to one of two joined semi-infinite elastic solids. The variation in the traction on the interface of a steel and Al plate is shown graphically.

3980 Stress-Strain Relations and Vibrations of a Granular Medium. J. Duffy and R. D. Mindlin. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 585-593.

A differential stress-strain relation is derived for a medium composed of a face-centered cubic array of elastic spheres in contact. The relation is based on the theory of elastic bodies in contact, and includes the effects of both normal and tangential components of contact forces.

3981 An Elongating String Under the Action of a Transverse Force. Werner Goldsmith. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 609-616.

The motion of a uniform undamped flexible string whose length increases with time was investigated when an arbitrary time-dependent force acts transversely at the free end. The method of characteristics was used to derive analytical expressions for the transverse displacement in the subsonic regime.

3982 Effect of Elastic Racks on Vibration Mounting of Equipment. R. A. Di Taranto. *Journal of Applied Mechanics*, v. 24, Dec. 1957, p. 617-620.

The over-all fundamental natural frequency of a uniform beam supported at each end by equal springs is determined in terms of the first-mode bending natural frequency of the beam and the natural frequency of the lumped mass beam on the two springs. This is qualitatively applied to the case of electronic equipment on elastic racks supported on vibration mounts.

3983 Using Digital Computers. John R. M. Alger. *Machine Design*, v. 29, Dec. 12, 1957, p. 128-132.

How to lighten the burden of routine design calculations; summary of the practices, problems, and possibilities of computerization.

3984 Design Guide for Stamped Gears. Federico Strasser. *Machine Design*, v. 29, Dec. 12, 1957, p. 161-165.

A guide to design of low-cost, lightweight, sheet-metal gear stampings for light or medium-duty service.

3985 Designing Equipment for Reliability. R. B. Wilson. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1142-1144.

System requirements; search for critical weakness; analyses of failures.

3986 Recent Developments and Future Trends in Vibration Isolation. Russell T. Lowe and Charles E. Crede. *Noise Control*, v. 3, Nov. 1957, p. 21-28.

3987 Noise Reduction in Machinery. Guy J. Sanders. *Noise Control*, v. 3, Nov. 1957, p. 29 + 9 pages.

Generation, transmission, and flow diagram techniques for studying noise in machinery are discussed.

3988* The Strength of Approximately Flat Long Rectangular Plates Under Lateral Pressure. J. Clarkson. *North East Coast Institution of Engineers & Shipbuilders, Transactions*, v. 74, Nov. 1957, p. 21-40.

Non-linear theory for analyzing the behavior under lateral pressure of mild-steel plates which have small permanent deflections takes account of both membrane tension and localized yielding around the edges.

3989 Radial Deformation of Rings Simplified. H. D. Tabakman. *Petroleum Refiner*, v. 36, Dec. 1957, p. 159-164.

Annular rings are used to transmit transverse forces and moments into a circular shell. The laborious energy method of calculating radial ring deformation may be replaced by these simplified solutions.

3990 Proceedings of the Fifth Japan National Congress for Applied Mechanics, 1955. 574 p. 1956. Science Council of Japan, Tokyo, Japan. (TA350 J27p)

Includes papers on elasticity, plasticity, soil mechanics, hydrodynamics, aerodynamics, hydraulics, lubrication, heat and heat transfer, vibration, computation, and automatic controls.

3991 Watch Out for Compression Loads. L. A. Yerkovich. *Product Engineering*, v. 28, Dec. 9, 1957, p. 72-75.

Discussion of commonly overlooked facts on effect of cold working; temperature effects, compression creep, sheet properties vs. bar, and how compression tests are run.

3992 When Splines Need Stress Control. Darle W. Dudley. *Product Engineering*, v. 28, Dec. 23, 1957, p. 56-61.

Charts and formulas for computing four important types of stresses that must not be exceeded if a design is to work successfully.

3993* (French.) Application of Extensometry to the Study of Light Alloy Pieces. **Application de l'extensométrie à l'étude des pièces en alliage léger.** G. Darnault. *Revue de Métallurgie*, v. 54, no. 11, Nov. 1957, p. 889-895.

Current extensometric processes (strain gages, cracking varnishes) are briefly described. Some examples and results of tests performed with light alloys presented.

3994 Buckling at High Temperature. N. J. Hoff. *Royal Aeronautical Society, Journal*, v. 61, Nov. 1957, p. 756-774.

A survey of the known solutions of problems, and new theories of the creep buckling of columns and of thin, circular, cylindrical shells.

3995 Folding Instability of a Layered Viscoelastic Medium Under Compression. M. A. Biot. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 444-454.

A preliminary theory is established for the stability of a viscoelastic layer sandwiched in an infinitely extended medium of another viscoelastic material when a compressive force is acting in a direction parallel with the layer.

3996* (Romanian.) A Method for the Dynamic Calculation of Tubes and Circular Cylindrical Casings Under Stress. **O metodă pentru calculul dinamic al turburilor si invelitorilor cilindrice circulare.** V. Visarion. *Studii şi Cercetări de Mecanică Aplicată*, v. 8, no. 2, 1957, p. 491-510.

A general method for the static case was extended to the dynamic calculation of cylindrical casings and circular tubes.

3997* (Italian.) The Distribution of Stresses in Circular Disks With Rectangular Aperture at Rounded Corners Charged Externally With a Uniform Pressure. **Ripartizione delle tensioni in piastre circolari con foro rettangolare a spigoli arrotondati caricate esternamente con pressione uniforme.** Franco di Benedetto. *Tecnica Italiana*, v. 22, no. 6, Sept. 1957, p. 377-380.

The photoelastic method was used for determining the stress distribution in circular disks of constant thickness.

3998 Thermal Stresses, With Applications to Airplanes, Missiles, Turbines, and Nuclear Reactors. B. E. Gatewood. 232 p. 1957. McGraw-Hill, New York. (TA405 G22t)

All phases of the analysis and design of structures at elevated temperatures are covered, including temperature distribution, elastic and inelastic thermal stresses, combined applied and thermal stresses, allowable stresses of various materials at elevated temperatures, and the buckling, deflection, stiffness, fatigue, shock, and flutter effects.

3999* Hydraulics for the Tool Engineer. I. Fluids and Power Units. H. L. Stewart and J. M. Moritz. *Tool Engineer*, v. 39, Dec. 1957, p. 81-85.

Hydraulic fluids, pumps, reservoirs, filters, after coolers, and accumulators are discussed.

4000* (German.) The Plane Stress Condition in a Rotating Disc With a Thickness Profile $h(r)=1/(ar^2+b)$ Under a Load Applied on an Arbitrary Plane Edge. **Der ebene Spannungszustand in einer durch beliebige ebene Randlasten beanspruchten rotierenden Vollscheibe mit dem Stärkenprofil $h(r)=1/(ar^2+b)$. I.** Rotating Symmetrical Plane Edge Loads on a Revolving Disc. **Drehsymmetrische ebene Randlasten an der rotierenden Scheibe.** Ernst Adams. *Zeitschrift für Flugwissenschaften*, v. 5, no. 11, Nov. 1957, p. 331-334.

See also: **3096** (thermal creep design criteria); **3652** (hydraulic control of automatic machinery); **4099** (design of light alloy castings); **4182** (design of rolled threads); **4188** (air compressors).

METALLURGY

4001* (Portuguese.) A Scientific Revolution and the Metals and Alloys of the Future. **A Revolução científica e os metais e ligas do futuro.** Luiz Coelho Corrêa da Silva. *ABM (Boletim da Associação Brasileira de Metais)*, v. 13, no. 48, July 1957, p. 195-214.

Structural characteristics of the metals. Importance of the atomic nucleus in metallurgy. Changes in the periodic table and new metals. Distribution of electrons in crystals. Exceptional metal properties, progress in the field of intermetallic phases. Synthetic alloys and structure control.

4002* (German and French.) Lightweight Aluminum Construction and Its Use in Hydraulic Structures. **Leichtbauweise in Aluminium und seine Anwendung im Wasserbau.** Lothar J. Streuli. *Aluminium Suisse*, v. 7, no. 6, Nov. 1957, p. 219-224.

Lightweight metals and emergency gates; different systems used; architectural qualities; construction quality of the metal; static problems. Prespectives for the future.

4003 Impressions of European Steelmaking. Malcolm B. Antrim. *American Iron and Steel Institute, Preprint*, 1957, 13 p. (TS300 Am35ta Vis.)

Details of a study of European steel plants and practices prior to designing a new American installation.

4004* (Czech.) Soft Magnetic Sheets Currently in Use. **Soudobé elektrotechnické křemíkové plechy.** Eric Hubscher. *Elektrotechnický Obzor*, v. 46, no. 11, Nov. 1957, p. 574-585.

Reviews the characteristics of hot and cold rolled sheet steel of both domestic and foreign manufacture. Effects of processing.

4005 Some Effects of Heterogeneous Structures in Lead Pipes. J. M. Butler. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 161-163.

4006* Electrical Sheet Steels for Power Transformers. F. Brailsford. *Institution of Electrical Engineers, Journal*, v. 3, no. 35, Nov. 1957, p. 569-575.

Comparison of silicon-iron with other materials. Development of grain-oriented Si-Fe for transformers; some problems with transformer steels.

4007 Neutron Irradiation. Some Effects on Structural Materials. W. D. Biggs. *Iron & Steel*, v. 30, Dec. 1957, p. 625-628.

Mechanism of radiation damage; effects on low temperature properties; age hardening and creep; corrosion.

4008 Low-Carbon Bainitic Steels. K. J. Irvine and F. B. Pickering. *Iron and Steel Institute, Journal*, v. 187, Dec. 1957, p. 292-309.

It is possible to produce weldable steels in the tensile strength range 40-80 tons/in. The main feature of these steels is that the normal polygonal ferrite formation is retarded so that transformation to bainitic ferrite can occur over a wide range of cooling rates. This is achieved most effectively with a ½% Mo-B base composition.

4009 Tantalum Annealing and Degassing and Hardness Effects of Dissolved Gases. Ralph H. Perkins. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2136, May 1957, 41 p. (UF767 U3La Contin.)

Conditions for take-up and removal of dissolved gases in Ta metal were determined, and the quantity of each gas correlated with the hardness of the metal. Under certain conditions, the measurement of hardness can serve as a rapid indicator of gas content. Oxygen, N, H, Ar, and He were studied.

4010 Mechanical Springs—Materials, Finishes and Embrittlement. Lester F. Spencer. *Metal Finishing*, v. 55, Dec. 1957, p. 56-60.

Composition of spring materials; protective coatings for springs; Cd and Zn plate; salt spray resistance of Zn and Cd electrodes; composite coatings. (To be continued.)

4011* (Russian.) Basic Directions for Development of Tool Steels. **Osnovnye napravleniia v razvitii instrumental'nykh stalei.** Iu. A. Geller. *Metallovedenie i Obrabotka Metallov*, 1957, no. 11, Nov., p. 43-56.

Structures, properties, and methods of treatment of high-quality tool steels. Chemical composition, heat treatment, and properties of carbon, alloy, high Cr, and high-speed die and punch steels.

4012 Is Cobalt Harmful in Stainless Steel? Joseph R. Lane. *Metal Progress*, v. 72, Dec. 1957, p. 86-87.

In certain nuclear applications where neutron absorption converts the element into Co-60, stainless steels containing Co could become dangerous radiation sources.

4013 Precipitation Hardening Stainless Steels. *Metal Treatment and Drop Forging*, v. 24, Nov. 1957, p. 437-438.

F.V. 520 is a weldable stainless steel of high tensile strength and relatively low thermal expansion and with a corrosion resistance equal to that of the 18/8 steels. It is capable of withstanding the high frictional temperatures involved in the design of supersonic aircraft and missiles and is suitable both for air frames and "skin" purposes.

4014 Titanium Alloys. W. Stuart Lyman. Paper from "Report of the High-Strength High-Temperature Materials for Standard Parts Symposium". Aircraft Industries Assn. 1957. p. 195-219. (TL671.1 Ai76r)

Commercial Ti alloys, several unalloyed grades and at least ten alloy grades, are available for the manufacture of standard parts. Strength, physical properties, and corrosion resistance of these alloys have been studied, and their usefulness in standard parts to operate up to 800 F is assured. Heat treatment and further alloy development work can be expected to increase the useful range of applications for Ti. Maximum use temperature should increase possibly to 1,000 F or higher.

4015 Uranium in South Africa, 1946-1956. v. I-II. 546 and 483 p. 1957. Associated Scientific & Technical Societies of South Africa, Johannesburg. (TN799.U7 Url)

A symposium of papers concerning the development, techniques, and processes of the South African uranium industry.

See also: **3112** (high-strength high temperature metals and alloys); **3115** (steel for aircraft); **4350** (fabrication of uranium fuel rods).

METALS—CORROSION

4016* Influence of Bicarbonate Ion on Inhibition of Corrosion by Sodium Silicate in a Zinc-Iron System. Henry L. Shuldener and Leo Lehrman. *American Water Works Association, Journal*, v. 49, Nov. 1957, p. 1432-1440.

Effect of Zn, SiO_2, pH, and temperature on corrosion of rotating galvanized pipe.

4017* (German.) The Corrosion of Metals With Imperfect Coatings. **Die Korrosion von Metallen mit unvollständigen Deckschichten.** Hans-Jürgen Engell. *Archiv für das Eisenhüttenwesen*, v. 28, no. 11, Nov. 1957, p. 753-760.

Shows how the electric resistivity of solution and coating affects corrosion. Some methods for measuring the electrochemical reactions during corrosion of metals with imperfect coatings are reported.

4018 Accelerated Salt Spray Testing of Plated Parts. George L. Sukes. *Automotive Industries*, v. 117, Dec. 1, 1957, p. 54 + 2 pages.

4019 Plastic Flow of Iron Oxides and the Oxidation of Iron. J. D. Mackenzie and C. E. Birchenall. *Corrosion*, v. 13, Dec. 1957, p. 783t-785t.

Under certain conditions, the oxidation of Fe in O at high temperatures is accompanied by the formation of a central box-like cavity, the dimensions of which are identical to those of the original iron specimen. The decrease in size of this cavity with increasing temperature and its disappearance when the formation of magnetite and hematite is excluded by a controlled oxidizing potential indicates that the plastic properties of the oxides may be an important factor.

4020 The Static Electrode Potential Behavior of Aluminum and the Anodic Behavior of the Pure Metal and Its Alloys in Chloride Media. E. M. Khairy and M. Kamal Hussein. *Corrosion*, v. 13, Dec. 1957, p. 793t-798t.

4021 Inhibiting Effect of Hydrofluoric Acid in Fuming Nitric Acid on Liquid and Gas Phase Corrosion of Several Metals. David M. Mason, Lois L. Taylor, and John B. Rittenhouse. *Corrosion*, v. 13, Dec. 1957, p. 821t-827t.

Commercially pure Pb was inhibited by HF, whereas pure Cr, Ni-A, Ta, and Ti alloys 75A and 130A were either only slightly inhibited or showed corrosion rates which actually were increased by presence of HF in fuming HNO_3.

4022* (French.) Relationship Between the Intensity of the Cathodic Protective Current and the Intensity of the Stray Current Circulating in Metallic Underground Pipes. **Relations entre l'intensité du courant de protection cathodique et l'intensité du courant vagabond circulant dans des conduites métalliques souterraines.** Stefan Minc and Zbigniew Feldblum. *Corrosion et Anticorrosion*, v. 5, no. 11, Nov. 1957, p. 308-314.

Laboratory reproduction of conditions existing in the ground. Hypotheses and proofs concerning relationship between intensity of the stray current through the pipe and intensity of the minimum current necessary for total protection.

4023* (French.) Analyses of Types of Corrosion Found in 18/8 Stainless Tubes. Their Causes and Their Prevention. **Analyse de types de corrosion recontrés dans des cas d'emploi de tubes en acier inoxydable 18/8. Leurs causes et leur prévention.** J. Dedieu and L. Pennec. *Corrosion et Anticorrosion*, v. 5, no. 11, Nov. 1957, p. 348-358.

Different types of corrosion in stainless steel pipes: surface rust, spot corrosion, and intergranular corrosion after carburization. Causes and preventive methods.

4024 Corrosion Problems With Fuming Nitric Acid. Rocket Fuel Requires New Tests. M. G. Fontana. *Corrosion Technology*, v. 4, Dec. 1957, p. 423-424.

Report of some research on the corrosive effects of acid upon the materials which contact it.

4025 Reaction of Hydrogen With Peroxidized Zircaloy-2 at 300° to 400° C. Earl A. Gulbransen and Kenneth F. Andrew. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 709-712.

The reaction starts at localized areas and spreads through the metal with hydride and oxide film spalling from the metal continually.

4026 The Influence of Surface Pretreatment on the Atmospheric Oxidation of 2S (U. S. Alloy 1100) Aluminum. Philip M. Aziz and Hugh P. Godard. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 738-739.

4027 Observations on the Mechanisms and Kinetics of Aqueous Aluminum Corrosion. I. The Role of the Corrosion Product Film in the Uniform Aqueous Corrosion of Aluminum. V. H. Troutner. **II. Kinetics of Aqueous Aluminum Corrosion.** R. L. Dillon. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51849, Sept. 1957, 29 p. (UF767 Un3.1hw Contin.)

4028 Investigations Into the Stress-Corrosion Cracking in Welded Gas Plant. *Institution of Gas Engineers, Copyright Publication No.* 517, 1957, 16 p. (TP700 In7.3c Vis.)

Stress-corrosion cracking can be produced by synthetic solutions of types which could be present in Gas Works liquors. Compositions of such solutions correlated with those of liquors taken from Gas Works where cracking was observed.

4029* (Russian.) The Effect of Temperature on the Rate of Corrosion in Metals. **Vliianie temperatury na skorost' korrozii metallov.** V. V. Gerasimov and I. L. Rozenfel'd. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* 1957, no. 10, Oct., p. 1166-1171.

Behavior of Fe, Cu, Zn, Ni, Pb, and Mg in 1.0 *N* NaCl, 1.0 *N* NaCl + 0.1 N HCL, 1.0 N NaCl + 0.1 *N* NaOH, and 1.0 *N* NaCl + 0.1 *N* KMnO solutions at 20, 50, 80, and 95 C.

4030* (Russian.) Prevention of Corrosion of Dry-Ice Plant Equipment. **Sposoby bor'by s korroziei oborudovaniia na zavodakh sukhogo l'da.** V. Muravlianskii. *Kholodil'naia Tekhnika,* v. 34, no. 4, Oct.-Dec. 1957, p. 17-21.

Observations and data from a number of dry-ice plants in U.S.S.R.; prevention of corrosion of equipment using an aqueous solution of monoethanolamine.

4031* (Russian.) Electrode Potential and Oxidation Speed of Copper in Alkali Solutions. **Elektrodnye potentsialy i skorost' okisleniia medi v shchelochnykh rastvorakh.** V. M. Kadek and L. K. Lepin'. *Latvijas PSR Zinātnu Akademija Vestis,* no. 9, 1957, p. 125-133.

Study of electrochemical and corrosive behavior of Cu in Na_2CO_3 and NaOH solutions.

4032 Corrosion of Beryllium in 600°F Water. D. S. Kneppel. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission),* NMI-1190, Sept. 1957, 21 p. (UF767 Un3.1nm Contin.)

The metal had a maximum life of 140 to 160 days before accelerated local attack; only quenching from about 1750 F gave any indication of improving corrosion resistance.

4033 The Aqueous Corrosion of Zircaloy Clad Thorium. S. Isserow. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission),* NMI-1191, Sept. 1957, 25 p. (UF767 Un3.1nm Contin.)

Preparation of rods. Diffusion heat treatment. Effect of C addition and aging. Corrosion tests of intentionally defected rods.

4034* (English.) **Growth of Oxide Whiskers on Metals at High Temperature.** Riitsu Takagi. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1212-1218.

4035* (German.) Weldable Al-Mg Alloys. **Schweissbare AlMg-Legierungen.** P. Brenner. *Schweissen und Schneiden,* v. 9, no. 11, Nov. 1957, p. 483-492.

Resistance to atmospheric influences and sea water of unwelded and welded AlMg4 and AlMg5 plates. Stress corrosion sensitivity.

4036* (Russian.) Effect of Boiler Rear Wall Surface Temperature on the Corrosion Rate in Flue Gas Media. **Vliianie temperatury stenki khvostovykh poverkhnostei kotel'nykh agregatov na skorost' korrozii v srede dymovykh gazov.** R. A. Petrosian. *Teploenergetika,* v. 4, no. 12, Dec. 1957, p. 16-20.

4037* (Russian.) Erosion of Water and Steam Sealing Equipment. **Erozionnyi iznos uplotnenii vodianoi i parovoi armatury.** A. V. Ratner and V. G. Zelenskii. *Teploenergetika,* v. 4, no. 12, Dec. 1957, p. 28-32.

Erosion and wear, caused by water and steam, of various materials for pipes, seals, joints, or connections.

4038* (Russian.) A Study of the Mechanism of the Atmospheric Corrosion of Iron in the Presence of Sulfur Dioxide as Aggressive Agent. **Issledovanie mekhanizma atmosfernoi korrozii zheleza v prisutstvii sernistogo gaza kak agressora.** Z. A. Iofa and G. G. Besproskurnov. *Zhurnal Fizicheskoi Khimii,* v. 31, no. 10, Oct. 1957, p. 2236-2244.

Initial corrosion rate and SO_2 concentration in the atmosphere. Analysis of the rust formed after 25 or 30 hrs. Ratio of the equivalents of S and Fe is close to 0.33. Electrochemical reactions at the Fe surface under a film of water.

4039* (Russian.) Kinetics of the Gas Corrosion of Magnesium Alloys. **Kinetika gazovoi korrozii magnievykh splavov.** I. A. Makolkin. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, Oct. 1957, p. 1542-1547.

Study of gas corrosion of Mg alloys ML-4 and ML-5 at temperatures below 400 C, and of alloy MA-1 in the range from 450 to 600 C.

4040* (Russian.) Corrosion Activity of a Nitrate-Nitrite Fusion. **Korrozionnaia aktivnost' nitrato-nitritnogo rasplava.** E. I. Gurovich and G. P. Shtokman. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, Oct. 1957, p. 1547-1552.

Selection of the best steel for construction of equipment and pipe lines for industries dealing with fused salts.

4041* (Russian.) Corrosion of Metals by Hydrogen Sulfide at High Temperature. **Korroziia metallov serovodorodom pri vysokoi temperature.** Kh. L. Tseitlin, L. V. Merzloukhova, and V. A. Strunkin. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, Oct. 1957, p. 1553-1558.

Corrosion stability of metals subjected to the action of H_2S and its mixtures with water, steam, and nitrogen at various concentrations.

4042* (Russian.) Solution of Copper, Iron, and Lead in Nitric Acid. **Rastvorenie medi, zheleza i svintsa v azotnoi kislote.** A. G. Loshkarev. *Zhurnal Prikladnoi Khimii,* v. 30, no. 10, Oct. 1957, p. 1558-1564.

The dissolution of solid Cu, Fe, and Pb in 2.60 to 13.0 *N* nitric acid at 17 to 37 C is limited by the rate of solvent diffusion toward the surface of the metal.

See also: **3299** (erosion in refining catalyst carrying system); **3612** (oxidation of Fe powder); **4171** (corrosion resistance of uranium alloys); **4234** (adsorption of oxygen on tungsten); **4275** (thickness measurement of corroded steel); **4414** (reaction of Zr with H_2O).

METALS—EXTRACTION AND REFINING

Errata. Item No. 974, Jan. 1958 issue. Article title in English should have read: Studies on the Iron(II) Oxide-Manganese(II) Oxide Diagram, and Its Relation to the Deoxidation of Pure Iron With Manganese.

4043 On the Ultimate Concentration Distribution in Zone-Melting. I. Braun. *British Journal of Applied Physics,* v. 8, Nov. 1957, p. 457-461.

An exact solution is given of this ultimate distribution for any value of the distribution coefficient *k*, taking into account the end-effect due to the normal freezing in the last zone. Graphs of the ultimate distribution are given for different values of *k* and the zone-length.

4044 Prevention of Brown Fumes When Blowing Oxygen Through Steel Baths. G. S. Sel'kin and N. I. Zadalya. *Henry Brutcher Translation No.* 4056. 8 p. (From *Stal',* v. 17, no. 10, 1957, p. 884-887.) Henry Brutcher, Altadena, Calif.

Merits of water addition to O in open-hearth and converter operations and in pre-refining of hot metal.

4045* (French.) The Effect of Smelting Conditions on Hardenability of Carbon Steel. **Influence de l'élaboration sur la trempabilité des aciers au carbone.** L. Lambert. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 14, no. 11, 1957, p. 2241-2251.

Characteristics of the casting processes with a basic open-hearth furnace. Effect of Mn content on hardenability. Results obtained with a 45/50 T. basic open-hearth furnace. Grain size and depth of hardening. Use of an electric furnace.

4046* (French.) Refining Phosphorous Cast Iron, and Especially Open-Hearth Furnace Steel With Pure Oxygen by the "IRSID" Process. **Affinage de fonte phosphoreuse, et en particulier de fonte Thomas, à l'oxygene pur par le procédé IRSID.** B. Trentini and M. Allard. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 14, no. 11, 1957, p. 2259-2266.

Finely divided lime in suspension in the oxygen jet directed to the bath; controlled concentration of the lime and adaptation to nature of melt and stage of operation. Interesting results with extra mild steels.

4047 Electric Furnace Steel Conference, 1956, Proceedings. v. XIV. 345 p. 1957. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TN706 EL25p Vis.)

Consists of 28 papers on economic considerations, electric furnace steel solidification, quality control interpretation, hot tearing problems, ladle refractories, fume control, and scrap sources.

4048 Future of Desiliconized Pig Iron for the Electric Furnace. S. L. Case. Paper from "Electric Furnace Steel Conference, 1956, Proceedings". v. XIV. American Institute of Mining, Metallurgical, and Petroleum Engineers. 1957. p. 295-299. (TN706 EL25p Vis.)

One of the important stumbling blocks in the comparative economics of open-hearth and electric furnaces for production of low carbon steel is the high Si content of the charge when the ratio of hot metal to scrap is 1 to 1 or higher. Each pound of Si added to the furnace charge produces more than two pounds of silica, which in turn requires about six pounds of lime to produce a slag of desirable characteristics; otherwise the economics of the electric furnace as a steel making unit compare very favorably with those of an open-hearth. Data cited herein give a very favorable outlook for desiliconization treatments of hot metal in electric furnace steel making, but it must be borne in mind that up to the present time there are no reported data on the use of as much as 70% of hot metal in the electric furnace charge.

4049* (French.) Refining of Heat Resistant Hypereutectic Aluminum-Silicon Alloys. **Affinage des alliages hypereutectiques aluminium-silicium, résistant a chaud.** M. Sergio Gallo. *Fonderie*, no. 141, Oct., p. 458-464.

Study of refining agents. Effect of Na and alkaline salts on refining capacity. Application to complex alloys with a lower Si content. Thermal expansions of alloys with 10 or 14% Si.

4050* (Czech.) Heating Air for the Blast Furnace. **Ohřev vysokopecního větru.** Miloslav Havelka. *Hutník*, v. 7, no. 11, Nov. 1957, p. 384-388.

Recommendations for suitable equipment for heaters and their control to improve operations and increase efficiency.

4051 Induction Vacuum Melting. Factors for Metallurgical Control. W. E. Jones. *Industrial Heating*, v. 24, Nov. 1957, p. 2256 + 7 pages.

Explains what occurs during the vacuum induction melting of a 1300 lb. alloy heat, and why close control of significant variables must be maintained for optimum metal properties.

4052 Simple Method for Semi-Continuous Casting of Bronze. I. E. C. Ellwood, J. C. Prytherch, and E. F. Phelps. *Industrial Heating*, v. 24, Nov. 1957, p. 2282 + 4 pages.

A relatively simple and inexpensive machine for semi-continuous casting of bronzes was designed and built, and rods and tubes of small dimensions were cast in a variety of alloys, using unlubricated graphite dies. (To be continued.)

4053 New Methods in Maintenance of Refractories in Steel Plants. I. *Industrial Heating*, v. 24, Nov. 1957, p. 2369 + 5 pages.

Automated techniques in open-hearth furnace maintenance through pre-fabricated assemblies; longer roof life by appropriate patching; improving the pouring performance of nozzles; brick-lined vs. cast-lined hot tops. (To be continued.)

4054 A Study of the Tuyere Combustion Zone. J. Taylor, G. Lonie, and R. Hay. *Iron and Steel Institute, Journal*, v. 187, Dec. 1957, p. 330-341.

Raceway measurements are a reliable guide to the extent of the combustion zone. An expression is derived for estimating the length of the raceway in terms of the velocity and density of the air, the tuyere diameter, and the coke size.

4055* (Russian.) Relationship Between Desulfurization and the Deoxidation of Steel. **Zavisimost' mezhdu desul'furatsiei i raskisleniem stali.** Z. Buzhek and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 9, Sept., p. 37-44.

Introduction of Si and Al into the bath accelerates desulfurization. Deoxidation and desulfurization of the metal take place simultaneously; S is removed together with the products of deoxidation.

4056* (Russian.) The Amount of Oxygen in Metal During the Acid Open-Hearth Smelting Process. **Kislorod v metalle v protsesse kisloi martenovskoi plavki.** M. M. Karnaukhov and A. Kh. Urazgil'deev. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 10, Oct., p. 47-54.

Investigation of 25 smeltings revealed that the amount of O in the rimming metal in the acid open-hearth furnace is lower than in the metal of the basic open-hearth furnace when the concentration of S is the same.

4057 Vacuum Melting in the Steel Industry Today. W. W. Dyrkacz. *Journal of Metals*, v. 9, Dec. 1957, p. 1513-1516.

Induction and consumable-electrode vacuum melting processes. Advantages and disadvantages.

4058 Analysis of Arc Furnace Control. J. H. Kogen. *Journal of Metals*, v. 9, Dec. 1957, p. 1525-1528.

A method for working out problems in arc furnace control, either on paper or with the aid of a computer, which eliminates costly guesswork.

4059 An Oxygen Steelmaking Process. F. W. Luerssen, J. W. Halley, and M. Tenenbaum. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Dec. 1957, p. 1533-1540.

High C, low P steel can now be made from pig iron containing 0.7% P or more, in a commercial sized open-hearth furnace. No external heat is required for refining, and steel produced is identical with basic open-hearth steel.

4060 Origin and Elimination of Hydrogen in Basic Open-Hearth Steels. W. L. Kerlie and J. H. Richards. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Dec. 1957, p. 1541-1548.

Water content of the furnace atmosphere, slag basicity, and degree of oxidation of the slag-metal system largely control the H in the steel.

4061* (German.) Importance of Vacuum Casting of Steel for Metallurgical Practice. **Bedeutung des Giessens von Stahl unter Vakuum für die hüttenmännische Praxis.** Zd. Eminger, Fr. Kinsky, and Zd. Kletečka. *Neue Hütte*, v. 2, no. 10, Oct. 1957, p. 590-600.

Reduction of H content. Influence of different casting conditions upon the properties of structural steels.

4062* (German.) Determination of Hydrogen in Solid and Liquid Pig Iron. **Zur Bestimmung des Wasserstoffs in festem und flüssigem Roheisen. I.** General and Experimental. **Allgemeiner und experimenteller Teil.** K. Zimmermann. **II.** The Hydrogen Content in Pig Iron as Shown by Tests. **Über den Wasserstoffgehalt im Roheisen an Hand der bisherigen Untersuchungen.** H. Uhlitzsch. *Neue Hütte*, v. 2, no. 10, Oct. 1957, p. 607-616.

The system Fe-H. Sampling. Analytical apparatus and methods. Behavior of H in pig iron from the time of blast-furnace tap to the finished pig.

4063* (German.) Study of the Wear of a Blast-Furnace Brick Work by Means of Radioactive Isotopes. **Untersuchung des Mauerwerkverschleisses an einem Hochofen mit radioaktiven Isotopen.** Joachim Holzhey. *Neue Hütte*, v. 2, no. 11, Nov. 1957, p. 665-670.

Furnace construction. Principle of measurement. Radiation sources. Measuring apparatus and techniques. Effects of radiation on the blast furnace; treatment of the active pig iron.

4064* (German.) Casting of Steel With Nitrogen as a Protective Gas. **Vergiessen von Stahl unter Stickstoff als Schutzgas.** Paul Holtzhaussen and Hans Fiedler. *Neue Hütte*, v. 2, no. 11, Nov. 1957, p. 685-691.

Casting of non-scaling and heat-resisting steel slabs and forging blocks. Improvement of block surfaces. Avoidance of defects and scrap.

4065* (German.) The Development and the Separation of Inclusions in Metal Smelts. **Zur Entstehung und Abscheidung von Einschlüssen in Metallschmelzen.** E. Schwarz-Bergkampf. *Radex Rundschau*, 1957, nos. 5-6, Sept., p. 708-710.

A theoretical study of the deoxidation process in liquid iron, concerning the separation of very small quantities of oxides, and the simultaneous influence of two oxidizing agents.

4066 (German.) Temperature Losses of Steel After Tapping. **Die Temperaturverluste des Stahles nach dem Abstich.** Herbert Neuhaus, Hans-Joachim Kirschning, and Werner Münstermann. *Stahl und Eisen*, v. 77, no. 23, Nov. 14, 1957, p. 1660-1666.

Comparison between optical and thermo-electric methods of measuring the temperature. Additional factors of influence on the temperature losses after tapping.

4067 (German.) Some Thoughts From an Industrial Engineering Point of View on the Performance of an Open-Hearth Steel Plant and of a Blooming Mill. **Betriebswirtschaftliche Überlegungen zur Leistung eines Siemens-Martin-Stahlwerks und eines Blockwalzwerks.** Helmut Kallenbach. *Stahl und Eisen*, v. 77, no. 23, Nov. 14, 1957, p. 1667-1673.

Effects of charging conditions on efficiency of open-hearth furnace and on costs of the steel produced.

4068 (German.) Contribution to the Metallurgy of Ferro-Manganese. **Zur Metallurgie des Ferromangans.** Gerhard Heynert, Jacob Willems, Willy Oelsen, and Eberhard Schürmann. *Stahl und Eisen*, v. 77, no. 24, Nov. 28, 1957, p. 1717-1728.

Phenomena occurring during the production of ferro-manganese in the blast furnace. Relations between Mn, Si, and C. Conditions for the production of alloys rich and poor in Si. Adequate slag ranges.

4069 (German.) Design, Equipment, and Operational Results of a Double-Chimney Open-Hearth Furnace. **Bauart, Ausrüstung und Betriebsergebnisse eines Zweikamin-Siemens-Martin-Ofens.** Ernst Goebel and Heimo Leopold. *Stahl und Eisen*, v. 77, no. 24, Nov. 28, 1957, p. 1733-1739.

See also: **3241** (magnesite linings for electric steel furnace).

METALS—FINISHING, POLISHING, AND CLEANING

4070 (German.) Surface Cleaning With Ultrasonics. **Oberflächenreinigung mit Ultraschall.** J. Olaf. *Acustica*, v. 7, no. 5, 1957, p. 253-263.

The conditions, especially those concerning cavitation, for cleaning surfaces by use of ultrasonics in the frequency range 15 to 2500 kc. per sec. are investigated. Measurements are made on mechanically polished glass surfaces with variable sound intensity and direction, time of irradiation, and liquid medium.

4071 Practical Method for Removing Oxides From Molybdenum. *Automotive Industries*, v. 117, Dec. 1, 1957, p. 53 + 2 pages.

Process involves two chemical baths, which satisfactorily remove all oxides without attacking the base metal.

4072 Preparation of Metal for Painting. Allen S. Dawe and John A. Kinn. *Industrial Heating*, v. 24, Nov. 1957, p. 2349 + 7 pages.

Covers cleaning, rustinhibition, and drying of work. (To be continued.)

4073 When to Use Solvent-Vapor Degreasing. C. E. Kircher. *Metal Finishing*, v. 55, Dec. 1957, p. 63 + 2 pages.

Pertinent information for analysis of the application of solvent-vapor degreasing to specific metal cleaning jobs.

4074* (Polish.) Recovery of Chromium and Copper From Pickling Liquors. **Odzyskiwanie chromu i miedzi z ługów potrawiennych.** C. Bandrowska and E. Buntner. *Przemysł Chemiczny*, v. 13, no. 10, Oct. 1957, p. 602-603.

Sodium sulfide was used for precipitating Cu and for simultaneous reduction of Cr(VI) to Cr(III) in pickling liquors. The recovered CuS and $Cr(OH)_3$, roasted at adequate temperatures, gave the oxides: CuO (97%) and Cr_2O_3 (96%).

4075* (Russian.) The Inhibiting Effect of the Heterocyclic Nitrous Bases During the Pickling of Steel With Sulfuric Acid in the Presence of Certain Anions. **O mekhanizme ingibitornogo deistviia geterotsiklicheskikh azotistykh osnovanii pri travlenii stali v sernoi kislote v prisutstvii nekotorykh anionov.** N. D. Rus'ianova and M. V. Goftman. *Zhurnal Prikladnoi Khimii*, v. 30, no. 10, Oct. 1957, p. 1564-1569.

The inhibiting action is increased in the presence of SCN, I, and Br anions; the CN, Cl, ferrocyanide, and ferricyanide anions increase the inhibiting effect only slightly.

See also: **3708** (polishing of uranium specimens).

METALS—FOUNDRY PRACTICE

4076* **Improvements in Surface Finish, Inspection, and Fettling of Grey-Iron Castings.** L. Clarke. *British Foundryman*, v. 50, pt. 2, Nov. 1957, p. 539-551.

Considers design, patterns, sands, gating additions, washes, shotblasting, controlled heat-treatment, visual gaging, hardness testing, crack detection, reduced fettling, effect of piecework systems, and standard gating and feeding methods.

4077* **Some Observations on Cupola Tapping.** F. D. Roper. *British Foundryman*, v. 50, pt. 2, Nov. 1957, p. 553-556.

A brief survey of the operations entailed in intermittent tapping of cupolas.

4078* (Italian.) Mechanization in Small Foundries. **La meccanizzazione nelle piccole fonderie.** *Fonderia*, v. 6, no. 10, Oct. 1957, p. 425-431.

Different levels of mechanization in molding, coremaking, transportation of sands, molds, and liquid metal, casting, feeding, and smelting.

4079* (French.) Pressure Casting of Small Precision Parts. **Le moulage sous pression des petites pièces de précision.** M. Marius Chevalier. *Fonderie*, 1957, no. 141, Oct., p. 437-444.

A study of pressure casting and its advantages. Qualities of alloys; molds and their construction; machines and their use; finishing.

4080 Factors Affecting the Surface Finish of Steel Castings. David V. Atterton. *Foundry*, v. 86, Jan. 1958, p. 78-83.

Methods of investigating defects; mechanism of metal penetration; metal-mold interface temperature; depth of penetration; surface tension; contact angle. (To be continued.)

4081 Shrinkage in Tin Bronze. II. Clyde L. Frear. *Foundry*, v. 86, Jan. 1958, p. 84-88.

Problems of dissolved gases, particularly H. Methods of preventing gas pickup. (To be concluded.)

4082 Efficient Cupola Operation. T. H. Burke. *Foundry*, v. 86, Jan. 1958, p. 89-93.

Deals with linings, coke, chill tests, fluxes, tuyeres, desulfurization, and other important factors.

4083 Controlling the CO_2 Process. F. L. Turk, J. J. Gutwald, and R. P. Lanz. *Foundry*, v. 86, Jan. 1958, p. 94-97.

Difficulties of introducing the CO_2 process into the foundry may be lessened by preliminary studies such as test methods described here.

4084 Permanent Mold Casting of Aluminum. C. B. Curtis. *Foundry*, v. 86, Jan. 1958, p. 98-102.

Foundry has converted successfully from a sand casting to a permanent mold operation and manufacturing economies have resulted.

4085* (German.) Oxide Patterns Appearing on the Surface of Molten Cast Iron. **Erscheinungsformen der Oxydhäute auf Gusseisenschmelzen.** Osamu Madono. *Giesserei*, v. 44, no. 24, Nov. 21, 1957, p. 714-718.

Chemical composition of the oxide film. The variety of patterns of the oxide skins. Effect of temperature and composition of the cast iron. The FeO-SiO_2 phase diagram. Reaction between the oxide film and the molten cast iron. Effects of Mn and gases.

4086* (German.) Measures to Reduce the Risk of Cracks. **Massnahmen zur Verringerung der Rissgefahr.** Walter Göchel. *Giessereitechnik*, v. 3, no. 10, Oct. 1957, p. 229-231.

Strains caused in castings by the cores, or due to defective pouring, defective position of the gates, or an unequal cooling rate. Design of a plate to reduce the risk of cracking.

4087 (Swedish.) The Carbon-Dioxide Process. **CO_2-processen.** D. V. Atterton. *Gjuteriet*, v. 47, no. 10, Oct. 1957, p. 157-166.

Gassing methods, patterns, core-boxes, production molds and cores. Experience in use of the process in different kinds of foundries.

4088* (Czech.) Pre-Purification of Cast Iron. **Předzkujňování surového železa.** Oldřich Bohuš. *Hutník*, v. 7, no. 11, Nov. 1957, p. 381-384.

Continuous process of pre-purification of molten cast iron by blowing air through metal flowing through a special vessel; purification of high-phosphorus cast iron with oxygen in the ladle.

4089 Investment Casting Engineering and Design Manual. 50 p. 1957. Investment Casting Inst., Chicago. (TS233 In8i Over.)

The investment casting process is described briefly as a matter of background information. Booklet is intended for product design, metallurgy, and purchasing personnel. Includes specifications and design factors for steels and Ni, Al, and Cu alloys.

4090* (Russian.) Performance of a Cupola With Controlled Gas Outflow by Means of a Forehearth. **Rabota vagranki s reguliruemym otborom gazov cherez kopil'nik.** G. G. Shepel'. *Liteinoe Proizvodstvo*, 1957, no. 11, Nov., p. 5-8.

Comparative experiments and results of smelting processes in a cupola with and without the forehearth.

4091* (Russian.) Rationalization of Production of Magnesium-Treated Iron Castings. **Ratsional'naia organizatsiia proizvodstva otlivok iz magnievogo chuguna.** S. F. Gorbunov and M. M. Levitan. *Liteinoe Proizvodstvo*, 1957, no. 11, Nov., p. 8-10.

Development of streamlined process for production of castings, characterized by its simplicity and applicability in any foundry.

4092* (Russian.) Mold Compacting by Compression, Vibro-Compression, and Vibration. **Ob uplotnenii liteinykh form pressovaniem, vibropressovaniem i vibratsiei.** L. E. Komarov. *Liteinoe Proizvodstvo*, 1957, no. 11, Nov., p. 10-15.

Experimental and theoretical investigations of above-mentioned methods of compacting and their application for large numbers of molds of various size and configuration.

4093 New Coring Method Broadens Uses of Light Metal Castings. John L. Everhart. *Materials in Design Engineering*, v. 46, Dec. 1957, p. 102-105.

How to make unlined passages to replace external connections or drilling operations.

4094* (Dutch.) Some Characteristic Properties of Water Glass as a Binding Agent for Molding and Core Sands. **Enkele karakteristieke eigenschappen van waterglas als bindmiddel voor vorm- en kernzand.** H. G. Levelink. *Metalen*, v. 12, no. 21, Nov. 15, 1957, p. 442-444.

Durability of sand mixtures following treatment with CO_2. Practical effect of the SiO_2/Na_2O ratio. Other possible applications of water glass as a binding agent.

4095* Die Casting. Gustav Lieby. *Modern Castings*, v. 32, Dec. 1957, p. 35-46.

Advantages; machines; alloys; design; competition.

4096* Stop-Look-Listen Before You Try Shell Molding. Arthur Woods. *Modern Castings*, v. 32, Dec. 1957, p. 50-54.

Planning pattern plates; gating and feeding; horizontal casting; cracking of shell molds; joining molds; shell cores; stack molding.

4097* (Polish.) Tertal — A Core Binder. **Tertal — spoiwo rdzeniowe.** Jan Buciewicz and Tadeusz Rzepa. *Przeglad Odlewnictwa*, v. 12, no. 10, Oct. 1957, p. 277-281.

New core binders "Tertal 30/10" and "Tertal 20/15", the product of polymerization of terpenes and polyterpenes with resin-fatty acids, were tested. Properties of mixtures of sand with the addition of cereals and dextrine.

4098 Recommended Safety Practices for the Protection of Workers in Foundries. 2nd Ed. 54 p. 1957. American Foundrymen's Society, Des Plaines, Ill. (TS236 Am35r Over.)

4099 (French.) Rules Concerning the Design of Light Alloy Castings. **Contribution aux règles du tracé des pièces coulées en alliages légers. I.** Charles Roinet. *Revue de l'Aluminium*, v. 34, no. 247, Oct. 1957, p. 1001-1014.

Deals with the properties of light alloys for casting; the main defects such as uneven shrinkage, cracks, and hot spots; and with various design rules for making strong and reliable parts. (To be continued.)

4100* (French.) Use of Gases in the Foundry and in Metallurgy. **Emploi des gaz en fonderie et en métallurgie.** Albert Portevin. *Revue de Métallurgie*, v. 54, no. 11, Nov. 1957, p. 813-816.

The influence of gas on the "quality" of the metal, i.e. on both the intrinsic properties of the metal and on properties of the casting as a whole. The active use of gas or the role played by the atmosphere during the series of operations which, taken together, constitute the foundry process: melting, holding, pouring, and solidification.

4101 (German.) Recent Developments in the Field of Malleable Castings. **Neuere Entwicklungen auf dem Gebiete des Tempergusses.** Karl Roesch. *Stahl und Eisen*, v. 77, no. 24, Nov. 28, 1957, p. 1747-1751.

Adequate conditions for the production of black- and white-heart malleable iron. Effects of melting, chemical composition, and heat-treatment on the structure and mechanical properties. Modern gas annealing plants for malleable iron castings.

See also: **3627** (quality of cast iron for enamelling); **3741** (design of die castings).

METALS—HEAT TREATMENT

4102* (Ukranian.) Properties of IIIX15 Steel at Low Temperatures Depending on the Heat Treatment Rate. **Svoistva stali ShKh 15 pri nizkikh temperaturakh v zavisimosti ot rezhimov termicheskoi obrabotki.** A. N. Istomina. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 489-493.

Effect of low temperatures (up to −60 and −183 C) on properties of heat-treated ball bearing steel. Optimum heat treatment affording the most favorable properties for the operation of precision ball bearings within the temperature range of +20 to −60 C.

4103* The Influence of Stress-Relieving on the Initiation of Brittle Fracture in Welded Plate Specimens. R. Kennedy. *British Welding Journal*, v. 4, Nov. 1957, p. 529-534.

A 650 C furnace treatment for 1 hr. is fully effective against brittle fracture, while the Linde method of local redistribution of residual stress provides a moderate degree of stress relief. Residual stress removal by general yielding is also fully effective, but could rarely be applied in practice.

4104 Heat Treatment of Silicon Using Zone Heating Techniques. H. C. Theuerer, J. M. Whelan, H. E. Bridgers, and E. Buehler. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 721-723.

With the floating zone apparatus, a liquid or solid hot zone may be caused to traverse the rod while the rest of the apparatus is kept relatively cool.

4105 Applications of Furnace Atmospheres. I. C. E. Peck. *Industrial Heating*, v. 24, Nov. 1957, p. 2268 + 7 pages.

Summarizes data on atmospheres that are suitable for specific heat treatment of metals. (To be continued.)

4106 Advantages of Fast Quenching and Common Misconceptions. Frank M. Aldridge. *Industrial Heating*, v. 24, Nov. 1957, p. 2301 + 2 pages.

Action of water in contact with hot steel; vapor phase control; marquenching temperatures; oil life.

4107 The Effect of Heat-Treatment on the Creep and Creep-Rupture Behaviour of a High-Purity Alpha Copper-Aluminium Alloy at 300° and 500°C. J. P. Dennison. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 177-181.

4108 The Production of Ferrite in Spheroidal Graphite Cast Iron by Heat-Treatment. John Gittus. *Iron & Steel*, v. 30, Dec. 1957, p. 639-641.

The heat-treatment commonly adopted involves both austenitization and ferritization.

4109 The Tempering of Low-Alloy Creep-Resistant Steels Containing Chromium, Molybdenum, and Vanadium. E. Smith and J. Nutting. *Iron and Steel Institute, Journal*, v. 187, Dec. 1957, p. 314-329.

Hardness changes occuring during the tempering of a range of quenched 0·2% C steels containing up to 3% Cr, 1% V, and 1% Mo were measured. The accompanying microstructural changes were determined by preparing extraction replicas and examining these with the electron microscope; the precipitated carbides were identified by transmission electron diffraction and selected-area electron diffraction.

4110* (Russian.) Improvement of Technological Processes in the Heat-Treatment of Large Forgings. **Opyt sovershenstvovaniia tekhnologicheskikh protsessov termicheskoi obrabotki krupnykh pokovok.** N. V. Fiksen. *Metallovedenie i Obrabotka Metallov*, 1957, no. 11, Nov., p. 77-80.

Experiments in the field of heat treatment of large forgings for breakdown stands or hydro-turbines. Rapid methods for volume and surface heat treatment of large parts (cross sections up to 1000 mm.).

4111 Nitriding of Large Forgings. C. W. Johnson. *Metal Progress*, v. 72, Dec. 1957, p. 99-101.

Large crankshafts for diesel engines, forged and completely machined, are nitrided. The nitrided surface notably increases fatigue strength and endurance, as well as wear. Distortion is minimized since no liquid quench is needed, and the piece is subjected simultaneously to a prolonged stress-relieving treatment, thus minimizing residual manufacturing stresses.

4112* (German.) Use, Manufacture and Heat Treatment of Alloyed Cast Steel Rolls. **Verwendung, Herstellung und Wärmebehandlung legierter Stahlgusswalzen. I.** Tensions Presenting Themselves During the Heat Treatment of Cast Steel Rolls and Their Calculation. **Bei der Wärmebehandlung von Stahlgusswalzen auftretende Spannungen und deren Berechnung.** Heinz Uhlitzsch and Gerhard Radomski. *Neue Hütte*, v. 2, no. 11, Nov. 1957, p. 655-664.

Calculations of the surface and interior temperature during the quenching of a roll; analysis of the variation of tensile stress with time and temperature.

4113* (German.) Investigations on the Tempering of Low-Alloyed Tool Steels With About 1% C. **Untersuchungen über den Anlassvorgang niedriglegierter Werkzeugstähle mit etwa 1% C.** H. Krainer, K. Ebner, E. Krainer, and M. Storek. *Radex Rundschau*, 1957, nos. 5-6, Sept., p. 803-831.

The behavior during tempering of three brands of steel 1% C, 1.5% Cr; 1.45% C, 1.5% Cr, 0.1% V; and 1% C, 1% Cr, 1.5% W after hardening is analyzed.

See also: **4045** (effect of smelting conditions on hardenability of steel); **4193** (heat treatment of rolled steel); **4224** (induction case-hardening of steel); **4340** (60-cycle induction heating).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

4114* (Ukranian.) On the Absorption by Superconducting Tin of Electromagnetic Radiation of Frequencies 8.3 X 10^{10} and 11.1 X 10^{10} Cycles. **O pogloshchenii sverkhprovodiashchim olovom elektromagnitnogo izlucheniia chastoty 8.3 X 10^{10} i 11.1 X 10^{10} gts.** P. A. Bezuglyi and O. O. Galkin. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 436-438.

An investigation in the range of 4 to 1.5 K, of the temperature dependence of a monocrystalline electrically polished thin specimen.

4115* (German.) Testing Setup and Test Performance in Static Tests of Long Duration. Equipment and Process for the Exact Determination of Creep and Fracture at Elevated Temperatures Under Constant or Varying Strain and Temperature. **Versuchseinrichtungen und Versuchsdurchführung bei Langzeit-Standversuchen. Einrichtungen und Verfahren zur genauen Ermittlung des Kriech- und Bruchverlaufs bei erhöhten Temperaturen unter gleichbleibender oder wechselnder Beanspruchung und Temperatur.** K. G. Olsson. *Archiv für das Eisenhüttenwesen*, v. 28, no. 11, Nov. 1957, p. 679-685.

Understanding the processes of creep and fracture under heat, determination of the relationship between these two phenomena, and the changes occurring in the material.

4116* A Comparison of Methods of Assessing Spot-Weld Ductility in Sheet Steels. I. Experimental Investigation. E. J. French and A. A. Wells. *British Welding Journal*, v. 4, Nov. 1957, p. 514-529.

Theoretical strengths derived from a consideration of idealized welds are compared with experimental results, the cruciform tension test showing a high degree of ductility discrimination lacking in the shear and torsion tests. The ratio of experimental to theoretical tension strength or the tension ratio is considered as a measure of spot-weld ductility together with other suitable tests.

4117* (Russian.) An Interpretation of the General Equation for the Creep of Metals. **Interpretatsiia obshchego uravneniia polzuchesti metallov.** I. A. Oding. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 66-69.

Derivation of fundamental equations of creep curves experimentally established for creep with constant diminishing, or increasing rates.

4118 Irradiation Effects in Uranium. S. H. Bush. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-51444, July 1957, 49 p. (UF767 Un3.1hw Contin.)

A review of pertinent physical metallurgical properties of irradiated U.

4119 The Viscosity of Lead, Tin, and Their Alloys. W. R. D. Jones and J. B. Davies. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 164-166.

The relationship between viscosity and temperature is as anticipated, except near the freezing point. Small additions of Sn increase the viscosity of Pb.

4120* (Russian.) Heat Resistance and Hot Hardness of Nickel-Chromium Alloys. **Zharoprochnost' i goriachaia tverdost' splavov sistemy nikel'-khrom.** N. T. Domotenko and I. I. Kornilov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 10, Oct., p. 36-40.

Effect of stress changes on heat resistance.

4121* (Russian.) Causes of Different Hot-Shortness in Alloys Having the Same Effective Crystallization Interval. **O prichinakh razlichnoi goriachelomkosti splavov s odinakovym effektivnym intervalom kristallizatsii.** N. N. Glagoleva, K. T. Matveeva, and I. I. Novikov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 10, Oct., p. 41-46.

Tensile strength of Al alloys at temperatures above the solidus.

4122* (Russian.) Effects of the Structural Characteristics of Ferromagnetic Materials on the Temperature of Spontaneous Magnetization. **Vliianie strukturnykh osobennostei ferromagnetikov na temperaturnyi khod spontannoi namagnichennosti.** K. P. Belov and A. N. Goriaga. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1038-1046.

A study of the curves of true magnetization near the Curie point for Ni-Cu, Ni_3Mn, and Ni-Fe alloys.

4123* (Russian.) Effect of Temperature on the Energy of Magnetic Anisotropy in Nickel. **Temperaturnaia Zavisimost' energii magnitnoi anizotropii v nikele.** I. M. Puzei. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1088-1093.

Measurement of the mechanical torque acting on a single crystal specimen in a magnetic field and calculation of the first anisotropy constant of a Ni single crystal. Effect of a field at 20.4 K.

4124* (Russian.) Effects of Surface Structure and Temperature on the Energy of Magnetic Anisotropy of Nickel-Iron Alloys. **Sverkhstruktura i temperaturnaia zavisimost' energii magnitnoi anizotropii nikel'-zheleznykh splavov.** I. M. Puzei. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1094-1104.

Effect of temperature on the anisotropic energy of binary Ni-Fe alloys, and the degree of order on the anisotropic energy of alloys of the Permalloy type, alloyed with Mo, Cr, and Cu.

4125* (Russian.) Residual Magnetic Properties of Nickel, and Its Stability. **Ostatochnaia namagnichennost' nikelia i ee ustoichivost'.** Ia. S. Shur and I. E. Startseva. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 9, Sept. 1957, p. 1240-1245.

The effect of different Ni treatments, which change its crystal structure, on residual magnetic properties and stability against alternating magnetic fields, temperature variations, and mechanical vibrations.

4126* (Russian.) The Effect of Plastic Deformation on the Barkhausen Effect. **Vliianie plasticheskoi deformatsii na effekt Barkgauzena.** K. Votruba. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 9, Sept. 1957, p. 1246-1249.

Study of the effect on samples made from Mu metal, Hypernik, Fe, and Ni.

4127 Heat Capacity of Calcium From 1.8 to 4.2° K. Maurice Graffel, R. W. Vest, and J. F. Smith. *Journal of Chemical Physics*, v. 27, Dec. 1957, p. 1267-1269.

4128* (Hungarian.) Processes Causing Changes in the Dimensions of Quenched Steel. **Méretváltozást okozó folyamatok az edzett acélban.** Zoltán Csepiga. *Kohászati Lapok*, v. 12, no. 6, June 1957, p. 228-233.

Summary of known data. Industrial experiments on bearing steel. Experimental methods and materials. Phase modifications as a result of continuous heating. (To be continued.)

4129 Fatigue Properties of Gray Iron. Franz R. Brotzen and John F. Wallace. *Machine Design*, v. 29, Dec. 12, 1957, p. 154-158.

Endurance limit and endurance ratio; influence of stress conditions; notch sensitivity; overstressing and understressing; effects of surface rolling, surface finish, structure, composition, section size, heat treatment, and high and low temperatures.

4130 Impact Resistance of Gray Iron. Franz R. Brotzen and John F. Wallace. *Machine Design*, v. 29, Dec. 26, 1957, p. 85-87.

Correlation of impact resistance and other properties; effect of composition.

4131 Weakness of Metals. D. A. Senior. *Machinery Lloyd (Overseas Ed.)*, v. 29, Nov. 23, 1957, p. 71-76.

A simplified account of current thinking on defects in metals, their causes, and methods of studying them.

4132* (Hungarian.) The Dependence Upon Temperature of the Differential Susceptibility of Cobalt in Strong Magnetic Fields. **A kobalt differenciális szuszceptibilitásának hőmérséklettől való függése erős mágneses terekben.** Lénárd Pál and Tivadar Tarnóczi. *Magyar Fizikai Folyóirat*, v. 5, no. 1, 1957, p. 29-39.

Interpretation of characteristic curve with two maxima on the basis of the theory of rotation processes. Comparison of temperature minima of monocrystals and polycrystals. Effect of the $\alpha \rightleftarrows \beta$ phase transformation on differential susceptibility.

4133* (Dutch.) Some Measurements and Considerations Concerning Alternating Bending Tests. **Enige metingen en beschouwingen betreffende de heen- en weerbuigproef.** J. Beekhuis. *Metalen*, v. 12, no. 21, Nov. 15, 1957, p. 430-436.

Bending moment and depth of cracks are determined in hard sheet Al as a function of the number of bends. Decrease of bending moment during the test can be attributed to creep and to increased depth of cracks.

4134* Brittle Fracture of Metals at Atmospheric and Sub-Zero Temperatures. C. F. Tipper. *Metallurgical Reviews*, v. 2, no. 7, 1957, p. 195-261 + 4 plates.

Fracture of metal crystals and polycrystalline aggregates; development of patterns on fracture surfaces; effect of a notch, high rates of loading, or pre-strain; fatigue; Ludwik's theory of fracture and notch brittleness; assessment of brittleness by means of mechanical tests; types of notch bar tests; metallurgical factors affecting fracture; fracture initiation and propagation.

4135 Improved Formability of Galvanized Sheet. J. R. Kattus. *Metal Progress*, v. 72, Dec. 1957, p. 82 + 4 pages.

High-speed tensile tests, on both smooth and notched specimens, show significant differences between the properties of galvanized sheet that are acceptable and those that are susceptible to breakage in fabrication on a Lockformer machine. The notched ultimate strength provides the best measure of performance, increasing strength being indicative of increasing susceptibility to breakage.

4136* (Russian.) Thermal and Electrical Properties of Copper Alloys. **Theplovye i elektricheskie svoistva splavov medi.** V. E. Mikriukov. *Moscow Universitet Vestnik. Seriia Matematiki Mekhaniki Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 57-64.

Temperature dependence of heat conductivity, electric conductivity and the Wiedemann-Franz relation of Cu+Co+Be+Ag, Cu+Co+Zr+Mo, Cu+Co+Zr+Fe, Cu+Co+Be+Ni, Cu+Co+Zr+Al, Cu+Co+Zr, Cu+Ni+Cr+P, and Cu+Ni+Zr+Sn alloys from room temperature to 700 C.

4137* (Russian.) The Effect of Pressure on the Galvanomagnetic Properties of Pb and Ga at Low Temperatures. **Issledovanie vliianiia davleniia na galvanomagnitnye svoistva Pb i Ga pri nizkikh temperaturakh.** N. B. Brandt. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 89-94.

A pressure of 1700 atm. shows no noticeable effect on Pb and Ga at normal temperatures.

4138* (Russian.) Temperature Dependence of the Galvanomagnetic Effect in Nickel-Copper and Nickel-Silicon Alloys. **Temperaturnaia zavisimost galvanomagnitnogo effekta v splavakh nickel-med' i nikel-kremnii.** O. S. Galkina. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 111-116.

Temperature dependence of electric resistance in the range from −195 C to above the curie point, and the longitudinal galvanomagnetic effect in the para-process on samples of Ni alloys with non-ferromagnetic additions.

4139* (Russian.) Thermal and Electrical Conductivity of Bismuth-Lead Alloys. **Teploprovodnost i elektroprovodnost splavov vismuta s olovom.** V. P. Cherpakov. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 129-134.

The temperature dependence of heat and electric conductivity, thermoelectromotive force, and Wiedemann-Franz ratio in Bi, Sn, Bi+Sn, and Bi+Pb alloys in the range from room temperature to the m. p. of the metal.

4140* (German.) Hydrogen in Steel, With Special Regard to Flake Cracks and Cracks Presenting Themselves in Steels During Higher Temperatures. **Wasserstoff im Stahl, insbesondere Flockenrisse und Risse, die bei höheren Temperaturen in Stählen entstehen.** Vl. Košelev. *Neue Hütte*, v. 2, no. 10, Oct. 1957, p. 601-604.

A study of fractures in steel. Effect of H pressure and internal cracks. Internal tension in relation to the temperature at which the γ-phase transforms to the α-phase.

4141* (German.) Hydrogen and Eddy Current Losses of Iron of Varying Silicon Content. **Wasserstoff und Wattverluste von Eisen unterschiedlichen Siliziumgehaltes.** Friedrich Erdmann-Jesnitzer, and Karl Schreck. *Neue Hütte*, v. 2, no. 10, Oct. 1957, p. 626-636.

Magnetic behavior of ferromagnetic bodies; modifications of properties and Si content. Influence of the impurities C, Al, Mo, Mn, and Cr. Influence of H on the magnetization curve.

4142* Hardness-Tensile Relationship for 7075 Aluminum Alloy. R. E. Kleint and George B. Mathers. *Nondestructive Testing*, v. 15, Nov.-Dec. 1957, p. 348-350.

4143 An Estimate of the Vapor Pressures of Thorium and Protactinium. E. W. Murbach. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1988, Nov. 1957, 13 p. (UF767 Un3.1na Contin.)

The vapor pressure of Th and Pa were estimated to be 4.2 x 10^{-6} and 5.1 x 10^{-5} atm. at 2200 K.

4144* (Hungarian.) Some Properties of Cast Iron Containing Titanium. **A titántartalmú öntöttvas néhány sajátossága.** Mocsy Árpád. *Öntöde*, v. 8, no. 6, June 1957, p. 121-129.

Industrial experimental series of Ti, Cr, Ti-Cr, and Cr-Ni cast irons. Effect of carbide stabilizing element on strength properties. Role of carbon content.

4145 Influence of Purity, Substrate Temperature, and Aging Conditions on the Extreme Ultraviolet Reflectance of Evaporated Aluminum. G. Hass, W. R. Hunter, and R. Tousey. *Optical Society of America, Journal*, v. 47, Dec. 1957, p. 1070-1073.

The wavelength range covered was 900-2200 A.

4146 The Internal Friction of Cold-Worked Copper at Low Temperatures. D. H. Niblett and J. Wilks. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1427-1444.

Measurements in the temperature range 20 to 300 K indicate how the internal friction varies as a function of the amount of cold work, and also the effect of impurities in the metal and neutron irradiation.

4147 On the Mechanical Properties of Indium Antimonide. J. W. Allen. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1475-1481 + 1 plate.

At room temperatures elastic behavior is observed up to the fracture point, while at higher temperatures glide occurs on (111) planes. Impact at room temperature can cause glide on (110) planes. A method of observing individual dislocations is described.

4148 Heat Capacity of Cu_3Au Below 4.2°K. John A. Rayne. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 649-651.

Studies of electronic heat capacities indicate considerable overlap into the third Brillouin zone for Cu_3Au in the ordered state. The Debye temperature was found to increase on ordering.

4149 Resistivity of Interstitials in Copper. R. J. Potter and D. L. Dexter. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 677-682.

Contributions from the defect itself and from the associated lattice strain are of comparable magnitude; interference between them tends to reduce resistivity.

4150 Magnetic Susceptibility of Germanium. Raymond Bowers. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 683-689.

4151 Mechanical Resonance Dispersion in Metals at Audio-Frequencies. Edwin R. Fitzgerald. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 690-706.

Measurements of the complex shear compliance of pure polycrystalline Pb, In, and Al resulted in the discovery of multiple resonance dispersions in the audio-frequency range.

4152 Electrical Resistivity of the Ni-Pd Alloy System Between 300 K and 730 K. A. I. Schindler, R. J. Smith, and E. I. Salkovitz. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 921-923.

Maximum resistivity was found to shift from 70 at.% Pd to 30 at.% Ni at room temperature, to the 50-50 composition at temperatures where all the specimens are paramagnetic. Matthiessen's rule is obeyed over the entire range of compositions.

4153 Light-Induced Plasticity in Semiconductors. G. C. Kuczynski and R. F. Hochman. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 946-948.

Light of wavelength between 2.0 and 4.0μ, or shorter than 0.4 μ, decreases the hardness of the surface layer of *n*-type-Ge by 10 to 60%. The softened layer extends to a depth of 1 to 2μ. A similar but less intense effect was observed in *p*-type Ge and *n*-type InSb and InAs. On the other hand, *p*-type Si seems to soften to a greater extent than Ge.

4154 Electron Irradiation of Copper Near 10 K. J. W. Corbett, J. M. Denney, M. D. Fiske, and R. M. Walker. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 954-964.

Resistivity change is investigated as a function of the electron flux, energy of the bombarding electrons, and specimen temperature. Recovery through annealing was studied using both isothermal and isochronal pulse anneals.

4155 Studies on Group III-V Intermetallic Compounds. C. Kolm, S. A. Kulin, and B. L. Averbach. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 965-971.

Properties of the compounds GaAs and InSb alloyed with Si, Ge, Sn, and Pb, and also quasi-binary InSb-GaSb.

4156 Electrical and Thermal Properties of Bi_2Te_3. C. B. Satterthwaite and R. W. Ure, Jr. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1164-1170.

4157 Magnetic Properties of UMn_2. S. T. Lin and A. R. Kaufmann. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1171-1174.

Study covered temperatures between 4.2 and 360 K.

4158 Magnetoresistance of Single Crystals of Copper. Roy Olson and Sergio Rodriguez. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1212-1218.

Measurements of the magnetoresistance coefficients at 4.2 and 20.4 K in single crystals of Cu, Ag, and Au in the low magnetic field range, and in single crystals of Ag for high magnetic field.

4159* (English.) **Studies on the Magnetic Anisotropy Induced by Cold Rolling of Ferromagnetic Crystal Iron-Nickel Alloys.** Sōshin Chikazumi, Kenzō Suzuki, and Hiroko Iwata. *Physical Society of Japan, Journal*, v. 12, Nov. 1957, p. 1259-1276.

Experiments were carried out on single crystals of Ni_3Fe through observation of magnetic domain patterns and torque measurements. Easy magnetizing direction was found to be normal to the roll direction for (110) [001] and (001) [100] rolling, while it changes to parallel to roll direction at about 30% reduction for (001) [110] rolling.

4160* (Czech.) Physical and Mechanical Properties of Tellurium Copper. **Własności fizyczne i mechaniczne miedzi tellurowej.** Z. Misiolek. *Prace Instytutów Ministerstwa Hutnictwa*, 1957, no. 5, p. 181-189.

Conditions for preparation of a primary alloy CuTe50, of melting and casting of the alloy CuTe, and also of cold and hot working of this alloy. Comparison of the effect of reduction of mechanical properties and electrical conductivity.

4161 The Properties of Zinc. 112 p. 1956. Consolidated Mining and Smelting Co. of Canada Ltd., Trail, B. C. (TN796 C76p Over.)

Reviews physical and mechanical properties of the metal with a cursory reference to its chemical and electrochemical properties.

4162* (German.) Warping of Cylindrical Structures, Due to Internal Stresses Caused by Welding. **Durch Schweisseigenspannungen an zylinderförmigen Konstruktionen ausgelöste Beulerscheinungen.** F. W. Bornscheuer. *Schweissen und Schneiden*, v. 9, no. 11, Nov. 1957, p. 492-494.

Internal welding stresses in structural elements subjected to compressive loading. Reduction of the load carrying capacity through compressive hoop stresses.

4163 (German.) Effect of Internal Stresses in Hardened Tool Steels on the Development of Grinding Cracks. **Einfluss von Eigenspannungen in gehärteten Werkzeugstählen auf die Entstehung von Schleifrissen.** Hans Bühler and Walter Schepp. *Stahl und Eisen*, v. 77, no. 23, Nov. 14, 1957, p. 1686-1690.

Distribution of internal stresses in cylindrical specimens which were partly quenched in water from different temperatures, taken from alloy steels containing: 0.05% C and 17% Ni, 1% C and 1.5% Cr, as well as from plain carbon tool steels containing 1% and 1.3% C.

4164 (Czech.) Case-Hardening of Steel and Its Influence Upon Strength Under Pulsating Loads. **Cementování a únavová pevnost materiálu.** A. Chit'kov. *Strojírenství*, v. 7, no. 11, Nov. 1957, p. 849-856.

Structural changes taking place during carburizing and hardening operations; properties of case-hardened parts.

4165* (Russian.) Thermal Fatigue of Metals. **O termicheskoi ustalosti metallov.** V. N. Kuznetsov. *Teploenergetika*, v. 4, no. 12, Dec. 1957, p. 32-35.

Comparison of thermal fatigue of steel tubes during radial heat flow in tension-compression tests.

4166* (Russian.) Measurement of Metal Heat Conductivity in a Wide Range of Temperatures During a Single Experiment. **Izmerenie temperaturoprovodnosti metallov v shirokom intervale temperatur za odin opyt.** O. A. Kraev. *Teploenergetika*, v. 4, no. 12, Dec. 1957, p. 69-72.

Equipment, method, theory, and experimental data in investigation of a series of metals.

4167 Investigation of the Compressive Strength and Creep of 7075-T6 Aluminum-Alloy Plates at Elevated Temperatures. William D. Deveikis. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4111, Nov. 1957, 28 p. (TL570 Un3t)

4168 Effect of Overheating on Creep-Rupture Properties of S-816 Alloy at 1,500°F. John P. Rowe and J. W. Freeman. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4081, Dec. 1957, 75 p. (TL570 Un3t)

Overheating reduces rupture life both through alteration of the internal structure of the alloy and, if stress is present during an overheat, by accelerated creep at the higher temperature. Such reduction in rupture life increases with the temperature and duration of overheating.

4169 Effect of Specimen Geometry on Charpy Low-Blow Transition Temperature. G. M. Orner and C. E. Hartbower. *Welding Journal*, v. 36, Dec. 1957, p. 521s-527s.

Within the limits of specimen size and notch types used, the low-blow transition temperature is independent of specimen geometry.

4170 Studies of the Weld Heat-Affected Zone of T-1 Steel. E. F. Nippes, W. F. Savage, and R. J. Allio. *Welding Journal*, v. 36, Dec. 1957, p. 531s-540s.

Slow cooling rates after welding, such as may result from either high energy input or high initial plate temperature, have a damaging effect upon notch toughness in the heat-affected zone of T-1 steel.

4171 Development and Properties of Uranium-Base Alloys Corrosion Resistant in High Temperature Water. IV. Radiation Stability of Uranium-Base Alloys. L. J. Jones, editor. *Westinghouse Electric Corporation, Bettis Plant (U. S. Atomic Energy Commission)*, WAPD-127, pt. 4, May 1957, 117 p. (UF767 Un3.1wa Contin.)

Effects of pile irradiations on physical properties and corrosion resistance of U-9, -10.5, -12, and -13.5 w/o Mo, U-10 w/o Nb; and U-3.8 w/o Si alloys. Changes in electrical resistivity, hardness, mechanical properties, and crystal structure.

4172* (Russian.) The Viscous and Electrical Properties of Liquid Binary Alloys and Their Relation to the Structure of the Liquid. **Viazkie i elektricheskie svoistva zhidkikh binarnykh splavov i ikh sviaz' so strukturoi zhidkosti.** D. K. Belashchenko. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2269-2277.

Liquid alloys of the systems Cd-Sb, Pb-Tl, and Bi-Tl show hysteresis of these properties whereas alloys of the systems Sb-Sn and Cd-Cu do not. Findings are correlated with other phenomena.

See also: **3624** (reflectance of Ge evaporated coating); **3966** (steel or Al in aircraft cylinders); **4049** (thermal expansion of Al-Si alloys); **4107** (creep and creep rupture of Al-Cu alloys); **4111** (properties of nitrided steel forgings); **4112** (stresses in cast steel rolls); **4173** (properties of cold-rolled steel plate); **4194** (internal stresses in hot rolls); **4202** (maximum hardness of steel); **4254** (banded structure of forged steel); **4498** (magnetic properties of single crystals); **4509** (density of Hg).

METALS—MECHANICAL WORKING

4173* (Portuguese.) Properties of Thin, Cold-Rolled Steel Plates Produced by the National Iron Metallurgical Company. **Características das chapas finas de aço laminadas a frio produzidas pela companhia siderúrgica nacional.** Sylvio E. Friedrich. *ABM (Boletim da Associação Brasileira de Metais)*, v. 13, no. 48, July 1957, p. 245-266.

Method of cold thin plate production. Steels used and requirements for deep stamping; a new controlling process is quoted. Properties required for glass enameling and other applications. Restrictions.

4174 Establishing an Industry Standard for the Variation in Weight of Carbon Steel Sheets. D. H. W. Allan. *American Iron and Steel Institute, Preprint*, Nov. 1957, 10 p. (TS300 Am35ta Vis.)

Details of an industry-wide survey and analysis of 14,116 lifts.

4175 The Flanging and Pressing of the Dished Head. Harry S. Beers. *American Iron and Steel Institute, Preprint*, Nov. 1957, 23 p. (TS300 Am35ta Vis.)

An illustrated description of process for making heads for vessels, tanks, and other equipment.

4176 Modern Methods of Producing Flat Rolled Products. G. A. Jedenoff. *American Iron and Steel Institute, Preprint*, Nov. 1957, 32 p. (TS300 Am35ta Vis.)

A brief description of the modern facilities which are employed in the manufacture of flat rolled products, with special emphasis on modern instrumentation and controls, which are recent but very important additions to our steelmaking facilities.

4177* Ceramics in Actual Production Application. Alfred O. Haeme and Robert T. Hook. *Automatic Machining*, v. 19, Dec. 1957, p. 41-45.

Some tips on effective use of ceramic tools.

4178* Thread Rolling Fundamentals. Fred Nell. *Automatic Machining*, v. 19, Dec. 1957, p. 62-64.

Trouble spots to iron out for smooth, quality threads.

4179* (Czech.) Rolling of Stainless Steel Ingots. **Válcování ingotů z nerezavějící oceli.** Jan Chvojka. *Hutník*, v. 7, no. 11, Nov. 1957, p. 370-374.

Production and treatment of stainless steel ingots. Basic factors effecting the quality of rolled billets are chemical composition, temperature, time and speed of heating, and the method of rolling.

4180 Press-Form Metal Tubing With Simple Dies. Federico Strasser. *Iron Age*, v. 180, Dec. 12, 1957, p. 127-129.

Suitable press tooling is the key to mass production of short lengths of tubing from flat pieces of sheet metal. Die design not only determines how the tube seam is joined throughout its length, but it also permits curving or bending flat blanks into a variety of cross sectional forms.

4181* The Economics of Work Performed on a Numerically Controlled Machine Tool. Thomas V. Atwater, Jr. and Robert H. Gregory. *Journal of Industrial Engineering*, v. 8, Nov.-Dec. 1957, p. 337-352.

4182* How to Design for Thread Rolling. *Machine Design*, v. 29, Dec. 26, 1957, p. 102-112.

Knurl, spline, and serration rolling; selection of materials for the process.

4183 How to Drill 6AL-4V Titanium Alloy. G. P. Campbell and A. Searle. *Mechanical Engineering*, v. 79, Nov. 1957, p. 1025-1028.

4184 The Titanium-Sheet-Rolling Program. N. E. Promisel and William J. Harris, Jr. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1112-1115.

A review of a program designed to develop optimum techniques for producing high-strength Ti alloys, to develop the design-engineering data required for their use in military equipment, and to enable manufacturers to evaluate production quantities of the sheet.

4185* Extrusion Presses and Press Installations. E. K. L. Haffner and R. M. L. Elkan. *Metallurgical Reviews*, v. 2, no. 7, 1957, p. 263-303 + 9 plates.

Review of recent developments.

4186* (French.) Standardized Tolerances on Steel Work Pieces Produced on Horizontal Forging Machines. **Tolérances normalisées pour les pièces en acier produites sur machine à forger horizontale.** Jean Husson and Henri Liotard. *Métallurgie et la Construction Mécanique*, v. 89, no. 11, Nov. 1957, p. 927 + 3 pages.

Operation of a forging machine; shapes produced. Dimensional variations of the work pieces obtained.

4187 Fabricating Techniques for Jewelry. Ralph H. Atkinson. *Metal Progress*, v. 72, Dec. 1957, p. 94-98.

Blanking, coining, stamping, and pressing are the methods most used for producing jewelry shapes. These, plus soldering and finishing, are the basis of the manufacturing jeweler's craft.

4188 Compressed Air and Its Applications. H. Kendall. *Metal Treatment and Drop Forging*, v. 24, Nov. 1957, p. 445 + 8 pages.

Use in forges and presses. Types of compressors.

4189* Titanium Problem Licked by New Hot Spinning Process. *Modern Metals*, v. 13, Dec. 1957, p. 66-67.

Titanium Fabricators, Inc. develops machines and method for making spherical pressure vessels for guided missiles.

4190 Peening Cuts Stresses in Plated Parts. Wesley W. Safee. *Product Engineering*, v. 28, Dec. 9, 1957, p. 92-93.

The peening method pounds surfaces of high-strength steel with shot to neutralize stresses caused by electroplating, especially chrome plating. It prevents cracks and increases fatigue life of parts.

4191* Fluid-Form, a New Saab-Method for the Forming of Sheet Metal Blanks Into Complicated Shapes. *Saab Sonics*, 1957, no. 25, p. 11-13.

Method of forming sheet metal blanks into dished or cupped objects by means of hydraulic pressure applied to the blank through an elastic diaphragm. Only one die block is required.

4192 Modern Presswork Techniques With Particular Reference to Multi-Stage Tooling and Transfer Pressing. II. T. G. Woodward. *Sheet Metal Industries*, v. 34, no. 368, Dec. 1957, p. 899-914.

Tool protection; use of compressed air; transfer press tooling; the rotary transfer press.

4193 The Cold Rolling of Extra-Hard Carbon Steel and Its Influence on Heat Treatments Involving Quenching. II. M. Massin. *Sheet Metal Industries*, v. 34, no. 368, Dec. 1957, p. 929-940.

Variations in Latent Energy as a function of the rolling reduction in the case where it is released after the α/γ transformation. Microstructures after cold rolling and their restoration by various heat-treatments.

4194 (German.) Internal Stresses in Hot Rolls Having Been Stressed in Service. **Eigenspannungen in Warmwalzen nach Betriebsbeanspruchung.** Hans Bühler. *Stahl und Eisen*, v. 77, no. 24, Nov. 28, 1957, p. 1740-1747.

Measuring methods. Dimensions of the rolls and materials used. Measurements on two steel roughing rolls of an old wire rod mill and on two rolls of a heavy plate rolling mill.

4195* (Russian.) Cutting Tools With Spiral-Shaped Edges Made From Hard Alloys. **Vintovye instumenty iz tverdykh splavov.** N. A. Rozno. *Stanki i Instrument*, v. 28, no. 11, Nov. 1957, p. 29-32.

Design and properties of multi-edge cutting tools, with large cutting angles. Methods for their manufacture, including insertion of hard-alloy cutters. Tools can be made of any length and with cutting edges at angles of 20 to 70°. This type of cutting tool gives faster machining with longer life of the tool.

4196 (Czech.) Theoretical Foundations of the Chip Forming Process and Improved Design of Cutting Tools. **Teoretické základy procesu samoutváření třísek a nová konstrukce břitu nástroje.** W. Biernawski. *Strojírenství*, v. 7, no. 11, Nov. 1957, p. 843-848.

Explains the importance of correct chip form for efficiency in machining operations, and the theory covering the processes taking place during forming of chips. Derives a new design for a cutting edge from theoretical conclusions.

4197* Facing at Constant Cutting Speed Saves Time. Max Kronenberg. *Tool Engineer*, v. 39, Dec. 1957, p. 93-95.

A simple mathematical analysis shows the savings that can be realized by face turning at constant cutting speed rather than constant rotational speed of workpiece.

4198* (Russian.) Determination of Some Parameters for a Pipe Drawing Process Using a "Floating" Mandrel. **Opredelenie nekotorykh sootnoshenii pri volochenii trub na "plavaiushchey" opravke.** V. Ia. Shapiro and A. A. Pavlov. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 54-60.

Drawing of Cu and Cu-Zn alloy pipe.

4199* (Russian.) Determining the Pressure of Rolls for Foil Rolling. **Opredelenie davleniia na valki pri prokatke fol'gi.** V. I. Karasevich. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 60-67.

Calculating the pressure in relation to thickness of foil.

4200* (German and French.) Bevelling With the Cutting Torch. A Modern Metal Working Process. **Der Schrägschnitt mit dem Schneidbrenner, ein modernes Verfahren der Metallbearbeitung.** Jean Prat. *Zeitschrift für Schweisstechnik*, v. 47, no. 10, Oct. 1957, p. 248-254.

Equipment, procedures, and applications of bevelling with the cutting torch.

See also: **3642** (life of lathe tools); **3650** (numerical control of machine tools); **3984** (production of stamped gears); **4163** (grinding cracks in hardened tool steels); **4216** (effect of extrusion variables on structure of Pb); **4436** (model for machine-tool replacement).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

4201* (Ukranian.) A Study of Interatomic Interaction in Interstitial Alloys by the Method of Wave Scattering. **Izuchenie mezhduatomnogo vzaimodeistviia v splavakh vnedreniia metodom rasseianiia voln.** V. V. Geichenko and A. A. Smirnov. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 470-473.

Application of the theory of X-ray scattering by interstitial alloys for determining constants of interatomic interaction.

4202* (Ukranian.) On the Nature of the Superhardness of Steel in Electrical Tempering. **K voprosu o prirode sverkhtverdosti stali pri elektrozakalke.** Y. A. Kocherzhynski and V. M. Pan. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 474-477.

Theorizes that maximum hardness is connected with a special metastable state. As this metastable state is characterized by the complete transformation of ferrite and the incomplete dissolution of cementite, the structure of quenched specimens consists of martensite with particles of cementite involved.

4203* (German.) Equilibrium Tests Within the Iron(II) Oxide-Zirconium Oxide System. **Gleichgewichtsuntersuchungen im System Eisen(II)-oxyd-Zirkonoxyd.** Wilhelm Anton Fischer and Alfred Hoffmann. *Archiv für das Eisenhüttenwesen*, v. 28, no. 11, Nov. 1957, p. 739-743.

System was studied above 1300 C by thermal analyses, microscopic, and X-ray tests as well as by metal-slag equilibria.

4204 A Shielded Metallograph for Remote Metallography. F. L. Brown, L. W. Haaker, S. H. Paine, and R. A. Blomgren. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5635, Oct. 1957, 32 p. (UF767 Un3.1an Contin.)

A Bausch and Lomb research metallograph is placed outside and adjacent to the metallographic preparation hot cell, and only the microscope section is shielded.

4205* (Russian.) Secondary Carbides and Formation of σ-Phase in Weld Joints of Stable Austenitic 25-20 Type Steel. **Vtorichnye karbidy i obrazovanie σ-fazy v svarnykh shvakh stabil'no austenitnoi stali tipa 25-20.** Iu. B. Malevskii and B. I. Medovar. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 86-94.

Electron-microscopic investigation of the carbide and σ-phases in weld joints. Postulates hypothesis on formation of σ-phase in weld joints of pure austenitic steels.

4206* (French.) X-Ray Diffraction Study of the Diagram of Gold Copper Alloys Near the Equiatomic Composition AuCu. **Étude par diffraction des rayons X du diagramme des alliages or-cuivre autour de la composition équiatomique AuCu.** Antoine Pianelli and René Faivre. *Comptes Rendus*, v. 245, no. 18, Oct. 28, 1957, p. 1537-1539.

4207* (French.) Prismatic Structure of Pure Polycrystalline Copper. **Structure prismatique du cuivre pur polycristallin.** Omer Goche, Jean Verstraeten, and Albert Art. *Comptes Rendus*, v. 245, no. 21, Nov. 18, 1957, p. 1813-1815 + 1 plate.

Microscopic examination of Cu surfaces treated by mechanical and electrolytical polishing and ion bombardment showed a prismatic structure.

4208* (French.) A Synthetic Approach to the Bainitic Transformation of Steel. **Essai de synthèse sur la transformation bainitique des aciers.** L. Habraken. *Comptes Rendus de Recherches*, 1957, no. 19, Nov., 122 p.

General data on bainitic transformation, study of a few types of steels. A circular and granular structure. Application of the hypotheses of Klier, Lyman, and others to austenite cell formation. Two mechanisms causing bainitic transformation.

4209* (Russian.) Relation Between the Lattice Parameters of Austenite and the Temperature at Which the Martensite Transformation Starts in Iron-Carbon Alloys. **O sviazi parametrov kristallicheskoi reshetki austenita s temperaturoi nachala martensitnogo prevrashcheniia v splavakh zheleza s uglerodom.** V. N. Gridnev and V. I. Trefilov. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 60-62.

Experiments to obtain direct data on compression of austenite at the transformation of martensite. Determination of lattice parameters of residual and hot-deformed austenite at room temperature; dependence of amount of deformed and hot deformed austenite on temperature at which martensite transformation starts.

4210* (Russian.) The Use of Tritium in the Radiographic Investigation of Hydrogen Distribution in Titanium and Zirconium. **O vozmozhnosti primeneniia tritiia dlia radiograficheskogo issledovaniia raspredeleniia vodoroda v titane i tsirkonii.** B. I. Bruk and G. I. Nikolaev. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 78-80 + 1 plate.

Method of obtaining tritium radiograms of Ti and Zr alloys specimens.

4211 Autoradiography Traces Additives in Metals. Robert H. Herrmann. *Foundry*, v. 86, Jan. 1958, p. 121 + 1 page.

Use of radioactive elements to study metal structure and the action of additives in alloys.

4212* (Czech.) The Influence of Silicon and Chromium on Eutectoid Isothermal Transformation of Austenite in Spheroidal Cast Iron. **Vliv křemíku a chromu na eutektoidní isothermickou přeměnu austenitu tvárné litiny.** Stanislav Drápal. *Hutnické Listy*, v. 12, no. 10, Oct. 1957, p. 899-906.

Kinetics of transformation and microstructure of products from isothermal transformation of austenite.

4213 The Equilibrium Diagram of the System Magnesium—Manganese. W. R. D. Jones. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 28, Dec. 1956, 4 p. (QD501 I7an Contin.)

4214 The Equilibrium Diagram of the System Magnesium—Zinc. W. R. D. Jones. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 29, Dec. 1956, 4 p. (QD501 I7an Contin.)

4215 The Equilibrium Diagram of the System Cobalt—Iron. A. Hellawell. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 30, Jan. 1957, 6 p. (QD501 I7an Contin.)

4216 The Influence of Extrusion Variables and Alloying Additions on the Grain-Size and Structural Stability of Extruded Lead. J. M. Butler. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 145-154.

Effects of extrusion temperature, speed, and extrusion ratio, and of small additions of Sb, Cu, and Sn were investigated.

4217 Certain Aspects of the Recrystallization of Lead and Dilute Lead Alloys. J. M. Butler. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 155-161.

Conditions under which commercial leads may recrystallize in manufacture or service to give undesirable heterogeneous structures was investigated.

4218 The Plutonium-Iron System. P. G. Mardon, H. R. Haines, J. H. Pearce, and M. B. Waldron. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 166-171.

Results verify the existence of the compounds Pu_6Fe and $PuFe_2$, a low-melting-point eutectic between δ-Pu and Pu_6Fe, and a high-melting-point eutectic between $PuFe_2$ and γ-iron.

4219 A Preliminary Investigation of the Plutonium-Thorium System. D. M. Poole, G. K. Williamson, and J. A. C. Marples. *Institute of Metals, Journal*, v. 86, 1957, p. 172-176.

X-ray, metallographic, thermal-analysis, and dilatometric studies were used to investigate the system.

4220 Aluminium-Rich Intermetallic-Compound Phases in the System Aluminium-Iron-Cobalt-Copper. G. V. Raynor and B. J. Ward. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 182-184.

Above was studied by metallographic and X-ray methods and by analysis of primary crystals.

4221 Lattice Spacings and Melting Points in the Thorium-Cerium System. R. T. Weiner, W. E. Freeth, and G. V. Raynor. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 185-188.

Studied by X-ray and micrographic methods, the system shows complete solid solution over the whole composition range at room temperature.

4222 The Constitution of Magnesium-Rich Magnesium-Aluminium-Calcium Alloys. J. A. Catterall and R. J. Pleasance. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 189-192.

Isothermal sections at 450, 370, and 290 C were determined.

4223* (Spanish.) The Thermodynamic Theory of the Constitution Diagram. **La teoria termodinamica de los diagramas de equilibrio. VII.** Binary Systems With Two or More Condensed Phases. **Sistemas binarios con dos o mas fases condensadas.** Francisco Muñoz del Corral. *Instituto del Hierro y del Acero*, v. 10, no. 53, July-Sept. 1957, p. 300-319.

Equilibrium relationships between the two condensed phases and conditions of internal stability of a binary phase. Two zones of internal unstability. Double phase and triple phase equilibria.

4224* (Spanish.) An Experimental Study of Some Factors Influencing the Quality and Depth of Case Hardening by High Frequency Induction in Carbon Steels. **Estudio experimental de algunos factores que afectan la calidad y profundidad del temple superficial por induccion a alta frecuencia en los aceros al carbono.** Miguel P. de Andrés Sanz. *Instituto del Hierro y del Acero*, v. 10, no. 53, July-Sept. 1957, p. 320-354.

An external, intermediate, and nuclear zone were determined by macro- and microscopic measurements during case hardening. Progressive austenitizing mechanism. Steels best suited to the process are F-114 and F-115.

4225* (French.) A Contribution to the Study of the Transformations of Austenite With 12% Mn. **Contribution à l'étude des transformations des austénites à 12% Mn.** G. Collette, et al. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 165, Oct. 1957, 56 p. (Reprinted from *Revue de Metallurgie*, v. 54, no. 6, June 1957, p. 433-486.) (TN602 In7p Vis.)

A study of transformations in industrial austenitic steel, covering constituents, kinetics, transformation mechanism, TTT curves, and structural changes.

4226 The Mechanism of Formation of Banded Structures. Paul G. Bastien. *Iron and Steel Institute, Journal,* v. 187, Dec. 1957, p. 281-291.

Concludes that the banded structure in steel is produced by chemical heterogeneity due to dendritic or small-scale segregation during the cooling of the ingot.

4227* (Russian.) The Effect of Supersonic Vibrations on the Initial Crystallization of Aluminum Alloys. **O vozdeistvii ul'trazvukovykh kolebanii na pervichnuiu kristallizatsiiu aliuminievykh splavov.** V. I. Slotin and G. I. Eskin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1957, no. 9, Sept., p. 33-36 + 2 plates.

Ultrasonic treatment during initial crystallization within the Al-Cu-Mg-Si system speeds up the hardening process and improves the mechanical properties of the alloy.

4228* (Russian.) Certain Peculiarities of the Polymorphous $\beta \rightarrow \alpha$ Tranformation of Pure (Iodide) Titanium. **Nekotorye osobennosti polimorfnogo $\beta \rightarrow \alpha$-prevrashcheniia chistogo (iodidnogo) titana.** E. I. Antipova, M. B. Guterman, and M. G. Lozinskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk,* 1957, no. 9, Sept., p. 45-49 + 6 plates.

Kinetics of crystalline growth of α-Ti within the polymorphous $\beta \rightarrow \alpha$ conversion is shown experimentally by high-temperature metallography.

4229* (Russian.) Relationship Between Diffusion and Heat Resistance in Ni Alloys. **O sviazi mezhdu diffuziei i zharoprochnost'iu v splavakh nikelevykh sistem.** I. I. Kornilov and A. Ia. Shiniaev. *Izvestiia Akademii Nauk SSSR, Otdelenie Teknicheskikh Nauk,* 1957, no. 9, Sept., p. 50-55.

Measurements of diffusion coefficients in alloys of the Ni-Ti, Ni-Ti-Cr, and Ni-Ti-Cr-W-Al systems show that, for all temperatures, the coefficient of diffusion reaches its highest value in the binary alloy.

4230* (Russian.) The Change of Structure and Properties of Hard Nickel Solid Solutions During Thermal Treatment. **Izmenenie stroeniia i svoistv nikelevykh tverdykh rastvorov pri termicheskoi obrabotke.** B. G. Livshits. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 9, Sept. 1957, p. 1225-1231 + 1 plate.

Relationship between electric resistance, microstructure, microhardness, phase structure, and thermal treatment.

4231* (Russian.) Kinetics of the Superlattice Transformation in Fe_3Al Alloy. **Kinetika sverkhstrukturniykh prevrashchenii splava Fe_3Al.** V. E. Rode. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia,* v. 21, no. 9, Sept. 1957, p. 1234-1238.

Changes in physical parameters during ordering in relation to intensity of the superlattice lines on X-ray diagrams.

4232 Adsorption and Diffusion of Hydrogen on Nickel. R. Wortman, R. Gomer, and R. Lundy. *Journal of Chemical Physics,* v. 27, Nov. 1957, p. 1099-1107.

Diffusion occurs with an activation energy of 7 ± 1 kcal. in the chemisorbed layer, without the precipitation boundaries observed on W. A field dependent transformation in the adsorbed film was found between 2 and 4 K and interpreted as a shift in the equilibrium between adsorbed H_2 molecules and the terminal fraction of adsorbed H atoms.

4233 Crystal Growth of Silver Metal. Mechanism and Kinetics. Welby G. Courtney. *Journal of Chemical Physics,* v. 27, Dec. 1957, p. 1349-1356.

The crystal growth of Ag metal whiskers and "ferns" was observed during the chemical reduction of Ag(I) with Fe(II) from aqueous solution. Whiskers and ferns appeared to grow by dislocation mechanisms, with new metal depositing at an axial screw dislocation emerging from the growing tip of the crystal.

4234 Adsorption and Diffusion of Oxygen on Tungsten. Robert Gomer and J. K. Hulm. *Journal of Chemical Physics,* v. 27, Dec. 1957, p. 1363-1376.

4235* (Hungarian.) New, Simple, and Rapid Method for Determining the Grain Size of Ferrous Alloys. **Ujabb, egyszerű es gyors eljárás vasötvözetek szemecsenagyságának meghatározására.** Ferenc Boda. *Kohászati Lapok,* v. 12, no. 6, June 1957, p. 246-249.

Method based on rapidly heating a specimen in a H_2 blast, with subsequent rapid cooling.

4236* (Russian.) Non-Metallic Inclusions in Magnesium-Treated Cast Iron. **Nemetallicheskie vkliucheniia v magnievom chugune.** A. E. Krivosheev and I. E. Lev. *Liteinoe Proizvodstvo,* 1957, no. 11, Nov., p. 18-19.

Investigations for specifying the desulfurizing action of Mg during treatment of cast iron, and to study the nature of nonmetallic inclusions.

4237* (Russian.) The Nature of Carbide Phase of White Iron. **Priroda karbidnoi fazy belogo chuguna.** F. K. Tkachenko and V. F. Zubarev. *Liteinoe Porizvodstvo,* 1957, no. 11, Nov., p. 20-21.

Mechanism of effect of Si in industrial white iron.

4238* (Dutch.) Crystal Structure and Recrystallization of Metals. **Kristallijne structuur en rekristallisatie van metalen.** W. G. Burgers and T. J. Tiedema. *Metalen,* v. 12, no. 22, Nov. 30, 1957, p. 458-464.

Structure of a grain boundary as dependent upon the mutual orientation relationship of the continuous grains. Comparison of the simplest model of a crystal grain boundary with experimental evidence. Review of secondary and primary recrystallization.

4239* (Russian.) Directions for Development of High-Temperature Metallography. **Napravleniia razvitiia vysokotemperaturnoi metallografii.** M. G. Lozinskii. *Metallovedenie i Obrabotka Metallov,* 1957, no. 11, Nov., p. 18-42 + 2 plates.

Development of methods and instruments permitting investigation of microstructure, and study of properties of metals and alloys in a range from room temperature up to 1200-1300 C.

4240* (Italian.) The Solubility of Aluminum and Silver in Silicon. **Sulla solubilirà dell'alluminio e dell'argento nel silicio.** V. Gottardi. *Metallurgia Italian,* v. 49, no. 10, Oct. 1957, p. 721-724.

The solubility of Al and Ag in Si was determined by spectrographic analysis of hypereutectic Si crystals separated from binary alloys.

4241 A New Record-Keeping System for Metallographic Laboratories. J. R. Driear. *Metal Progress,* v. 72, Dec. 1957, p. 89-91.

A simple numbering method for photographs, specimens, and pertinent information about laboratory investigations keeps them from losing their identies.

4242 Observation of Dislocation Sites in Iron. F. W. C. Boswell. *Metal Progress,* v. 72, Dec. 1957, p. 92-93.

Etch pits are useful in studying the arrangement and motions of dislocations in crystals.

4243 Recrystallized Surfaces of Aluminum Extrusions. Guy V. Bennett. *Metal Progress,* v. 72, Dec. 1957, p. 102-104.

"Cold" work at surfaces of extruded bar may nucleate recrystallization of deep surface layers, producing a layer of metal of low strength and endurance.

4244* (French.) Methods of Study and Factors of Intergranular Self-Diffusion in Metals. **Méthodes d'étude et facteurs de l'autodiffusion intergranulaire dans les métaux.** Georges Cizeron. *Métaux, Corrosion-Industries,* v. 32, no. 385, Sept. 1957, p. 315-332.

A survey of the various hypotheses concerning the structure of the grain boundary. Different methods used to study intergranular diffusion and grain growth. Interpretation of boundary slip, creep, and internal friction. Effects of crystal disorientation and of impurities.

4245* (German.) Influence of Chemical Composition and Structural Constitution on Behavior of Hydrogen in Iron and Steel. **Einfluss der chemischen Zusammensetzung und des Gefügeaufbaus auf das Wasserstoffverhalten im Eisen und Stahl.** W. Wichmann. *Neue Hütte,* v. 2, no. 10, Oct. 1957, p. 618-620.

4246* (German.) Hydrogen in Iron and Its Behavior. **Wasserstoff im Eisen und sein Verhalten.** Michael Smialowski. *Neue Hütte,* v. 2, no. 10, Oct. 1957, p. 621-626.

Dilatation effects caused by the penetration of H into iron. Diffusion coefficient at room temperature. Form of appearance of H in the Fe lattice.

4247 The Diffusion of Uranium Into Aluminum. T. K. Bierlein and D. R. Green. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 778-786.

Maximum values for the penetration coefficient are 0.075, 0.50, and 6.1 x 10^{-6} in.^{2}/hr. at temperature of 200, 250, and 390 C, respectively; the corresponding activation energy is 14,300 cal. per mole.

4248 (English.) **Time Decrease of Permeability in Iron.** A. J. Bosman, P. E. Brommer, H. J. Van Daal, and G. W. Rathenau. *Physica*, v. 23, no. 11, Nov. 1957, p. 989-1000.

The time decrease of initial permeability for iron containing interstitial N. The activation energy for N diffusion. A method for resolving the different relaxation times.

4249 (English.) **The Influence of Pressure on the Mean Time of Stay of Interstitial Nitrogen in Iron.** A. J. Bosman, P. E. Brommer, and G. W. Rathenau. *Physica*, v. 23, no. 11, Nov. 1957, p. 1001-1006.

The activation volume for interstitial N diffusion in b.c.c. iron is: (3.7 ± 3.3) 10^{-2} cm^3/mole. This corresponds to about 4% of the volume of the diffusing N atoms.

4250 Theory of Antiferromagnetic-Ferromagnetic Transitions in Dilute Magnetic Alloys and in the Rare Earths. George W. Pratt, Jr. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1233-1242.

4251* (German.) The Structure of Metalloid-Containing Phases in Alloys. **Der Aufbau metalloidhaltiger Phasen in Legierungen.** H. Nowotny and A. Wittmann. *Radex Rundschau*, 1957, nos. 5-6, Sept., p. 693-707.

Stresses the importance of X-ray methods for identifying the crystalline substances in isolates; describes the formation of alloys containing nonmetallic elements. The composition and structural principles of carbides, nitrides, borides, silicides, and germanides are analyzed.

4252* (German.) The Detection of Oxide Inclusions in Rimming Steel and Killed Steel, Unalloyed and Low-Alloyed Steels. **Die Erfassung der oxydischen Einschlüsse in beruhigten und teilberuhigten, unlegierten und niedriglegierten Stählen.** E. Piper, H. Hagedorn, H. Kern, and J. Ingeln. *Radex Rundschau*, 1957, nos. 5-6, Sept., p. 727-737.

A brief outline of the principles underlying the analysis of the residue is given, followed by precise instructions regarding the treatment of the isolates.

4253* (German.) The Formation and the Separation of Sulfide Inclusions in Steel and Cast Iron. **Zur Entstehung und Abscheidung von Sulfideinschlüssen in Stahl und Gussesisen.** E. Plöckinger and A. Randak. *Radex Rundschau*, 1957, nos. 5-6, Sept., p. 768-770.

4254* (French.) A Contribution to the Study of Banded Structure in Forged Steel. Action of Phosphorus in Particular. **Contribution à l'étude de la structure de bandes dans l'acier forgé. Étude particulière du rôle du phosphore.** C. Roques, C. Dubois, and P. Bastien. *Revue de Métallurgie*, v. 54, no. 11, Nov. 1957, p. 821-839.

Principal characteristics of banded structure are caused by microsegregations of various elements. Influence of P on the allotropic transformation $\gamma \rightarrow \alpha$. Effects of impurities such as As and Sn or alloying elements.

4255* (French.) Precipitation of the Ni_3Al Phase in an Alloy Containing 7.8% Aluminum. **Précipitation de la phase Ni_3Al dans un alliages à 7,8% d'aluminium.** Jack Manenc. *Revue de Métallurgie*, v. 54, no. 11, Nov. 1957, p. 867-878.

Evolution characterized by three stages (precipitation with an abnormal diffusion of the X-rays, quadratic intermediate phase, Ni_3Al equilibrium phase) is comparable to that found in 80-20 Ni-Cr alloys, which are creep-resistant at high temperature, as well as in other Ni-base alloys.

4256* (French.) Metallographic Aspects of Low Carbon Steels. **Les aspects métallographiques des aciers a bas carbone.** L. Habraken and T. Greday. *Revue Universelle des Mines*, v. 13, ser. 9, no. 11, Nov. 1957, p. 683-692 + 1 plate.

Structures of low carbon steels after different thermal treatments. Bainitic transformation and presence, after a critical heat treatment, of a small amount of stabilized austenite. Relationship between the structures examined by electronic metallography and some mechanical and physical properties of these steels.

4257 The Titanium-Germanium System From 0 to 30 Percent Germanium. V. C. Petersen and R. W. Huber. *U. S. Bureau of Mines, Report of Investigations* 5365, Oct. 1957, 20 p. (TN21 Un3r Vis.)

Surveys the Ti-Ge system between 400 and 1,370 C. High-purity Ti and Ti-Ge arc-melted alloys were used.

4258 Abnormal Grain Growth in M-252 and S-816 Alloys. R. F. Decker, A. I. Rush, A. G. Dano, and J. W. Freeman. *U. S. National Advisory Committee for Aeronautics, Technical Note* 4084, Nov. 1957, 61 p. (TL570 Un3t)

Small reductions of essentially strain-free metal were the basic cause.

4259 Abnormal Grain Growth in Nickel-Base Heat-Resistant Alloys. R. F. Decker, A. I. Rush, A. G. Dano, and J. W. Freeman. *U. S. National Advisory Committee for Aeronautics, Technical Note*, 4082, Dec. 1957, 70 p. (TL570 Un3t)

Small reductions of essentially strain-free metal were the basic cause of abnormal grain growth in air- and vacuum-melted Waspaloy, Inconel X-550, and Nimonic 80A alloys.

4260 A New Nickel-Boron Phase Diagram for Brazing-Alloy Development. G. S. Hoppin, III. *Welding Journal*, v. 36, Dec. 1957, p. 528s-530s.

The eutectic temperature was found to be 100 F lower than previously reported. It was established that B does have a finite solubility in Ni.

4261* (Russian.) Silicon-Containing Double Carbides. **Kremniisoderzhashchie dvoinye karbidy.** M. N. Kozlova and N. F. Lashko. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 11, Nov. 1957, p. 2517-2519.

Study of double carbides, electrolytically isolated from Ni-base alloys containing Cr, W, Mo, and Si. Metallographic examination showed that the amount of double carbides increases with increase of Si in the alloy.

4262* (Russian.) Constitution Diagrams of Titanium-Lanthanum, and Titanium-Cerium Alloys. **Diagrammy sostoianiia splavov titan-lantan i titan-tserii.** E. M. Savitskii and G. S. Burkhanov. *Zhurnal Neorganicheskoi Khimii*, v. 2, no. 11, Nov. 1957, p. 2609-2616 + 8 plates.

See also: **3389** (magnetic analysis of alloys by electron diffraction); **3436** (V-C-O system); **3622** (determination of diffusion coefficients); **3784** (production of dislocation in Ge); **3787** (perfection of semiconductor single crystals); **4108** (ferrite in nodular cast iron); **4109** (structure of low-alloy Cr-Mo-V steels); **4281** (structure of boron steels); **4329** (Al-Pu phase diagram); **4373** (lattice constants of Li isotopes); **4514** (X-ray crystal structure); **4620** (behavior of hydrogen in steel).

METALS—POWDER

4263* (Ukranian.) New Boride Phases of Rare-Earth Elements. **Novye boridy redkozemel'nykh elementov.** V. S. Neshpor and G. V. Samsonov. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 478-479.

Preparation and identification by means of X-rays of the following borides of Dy, Ho, and Lu: DyB_6, DyB_4, HoB_6, HoB_4, LuB_6, and LuB_4.

4264* (Russian.) Peculiarities of Technical Magnetization of Samples Made From Textured Fine Powders. **Osobennosti protsessov tekhnicheskogo namagnichivaniia v teksturovannykh obraztsakh iz tonkikh poroshkov.** *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 9, Sept. 1957, p. 1215-1219.

Study of Mn-Bi alloy powder to obtain relationships between magnetic properties and size of particles.

4265* (German.) Comparison Between the Specific Surface and the Particle Size Distribution of Chemically-Prepared Metal Powders and Their Oxides. **Vergleich zwischen spezifischer Oberfläche und Teilchengrössenverteilung von chemisch hergestellten Metallpulvern und deren Oyyden.** G. Ehrlich and D. Schulze. *Kolloid-Zeitschrift*, v. 155, no. 1, Nov. 1957, p. 19-31.

Critically examines the measurement of specific surface by the "BET" method and obtaining an average particle size from electron microscope powder specimens. The principal difficulty of surface measurement is the uncertainty of the surface requirement of an adsorption molecule in comparison with the absorber surface. The electron-microscopic examination is rendered difficult by the strong tendency of powders to agglomerate. Use of ultrasonics, however, gives satisfactory distributions.

4266* (German.) Production and Properties of Semi-Finished Tantalum Products. **Herstellung und Eigenschaften von Halbfabrikaten aus Tantal.** Jiri Vacek. *Neue Hütte*, v. 2, no. 11, Nov. 1957, p. 692-702.

Pressing of Ta powder; sintering; vacuum and temperature measurement; influence of sintering temperature and time; spectral analysis of the gases drawn off.

4267 Introducing Commercial Titanium Powder. Alfred R. Globus. *Precision Metal Molding*, v. 15, Dec. 1957, p. 38 + 2 pages.

The 99+% purity of "UniFide" combined with its compressibility, high green strength, and stability in air, provides a combination of properties which make it ideal for a wide range of industrial applications.

4268 Vacuum Sintering. III. Henry H. Hausner. *Precision Metal Molding*, v. 15, Dec. 1957, p. 44 + 3 pages.

Effects of evaporation and condensation in sintering Be; hydride decomposition during sintering of Zr.

4269 A Method of Surface Analysis and Its Application to Reduced Nickel Powder. M. W. Roberts and K. W. Sykes. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 534-543.

4270 (Czech.) Evaluation of the Quality of Sintered Carballoys. **K otázce hodnocení jakosti slinutých karbidů.** V. Dufek. *Strojírenství*, v. 7, no. 11, Nov. 1957, p. 857-861.

Deals with the most important properties of sintered carbides and with determining their composition. Explains the relation between the structure of carboalloys and their properties, and recent research work and conclusions derived from it for further development and improvement of testing methods and manufacturing technology. Equations based on values of standardized mechanical properties vs. strength and hardness are suggested for expressing the quality of carbides.

4271 (German.) Hard Metal Carbides Containing Low Additions of Auxiliary Metal. **Hilfsmetallarme Hartmetallegierungen.** C. Agte and R. Kohlermann. *Technik*, v. 12, no. 10, Oct. 1957, p. 686-689.

Highly wear-resistant carbides for cutting purposes. Effects of carburizing temperature on the content of bound and free C in fine-grained WC. Study of WC alloys with no binder and with 15 or 24% TiC and 2.5% Co.

4272 (German.) New Information About Properties and Production of Metal Ceramic WC-Co Alloys. **Neues über Eigenschaften und Herstellung metallkeramischer WC-Co-Legierungen.** W. J. Tretjakow. *Technik*, v. 12, no. 11, Nov. 1957, p. 733-735.

Hardness and resistance to rupture of sintered WC-Co alloys as function of the Co conent. Temperature relationship with the bending and breaking stress of alloys made of 94% WC and 6% Co with different grain sizes of the carbide phase. Effect of grinding on strength of the carbide.

4273 (German.) Substitution of Cobalt in Sintered Carbides by an Iron-Nickel Binder. **Austausch von Kobalt in Sinterhartmetallen durch einen Eisen-Nickel-Binder.** R. Kohlermann and R. Wehner. *Technik*, v. 12, no. 11, Nov. 1957, p. 736-740.

Importance of the binder in carbide alloys. Comparison between carbides with Co and FeNi binders during percussion drilling. Resistance to abrasion obtained by lowering the carbide content.

See also: **3612** (oxidation of Fe powder); **3938** (metal powder particle size analysis).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

4274* **Automatic Ultrasonic Inspection.** H. W. Taylor. *British Institution of Radio Engineers, Journal*, v. 17, Nov. 1957, p. 649-661.

Factors limiting the application of manual inspection under modern high speed production conditions. Automatic equipment recently developed to overcome these limitations.

4275* (French.) Determining the Decrease of Thickness of Steel Sheets and Steel Conduits Caused by Corrosion. **Contribution à la détermination des diminutions d'épaisseur des tôles et des conduits en acier provoquées par la corrosion.** M. G. Pirou. *Corrosion et Anticorrosion*, v. 5, no. 11, Nov. 1957, p. 339-347.

Different processes used to examine metallic walls: photography, television, acoustic, ultrasonic, radiographic, electric, and magnetic methods. Application of the magnetic method to check plates and ferrous materials of average thickness, immersed or exposed to air.

4276* **Brightness of Fluorescent Penetrans, Its Measurement and Influence in Detecting Defects.** D. W. Parker and J. T. Schmidt. *Nondestructive Testing*, v. 15, Nov.-Dec. 1957, p. 330 + 3 pages.

Advantages and disadvantages of various light measuring instruments; optimum procedure; precautions.

4277* **Refinements in Radiographic Techniques.** Harold S. Wyckoff. *Nondestructive Testing*, v. 15, Nov.-Dec. 1957, p. 336 + 4 pages.

Some suggested procedures for obtaining better results from established industrial methods.

4278* **Influence of Absorption Discontinuities on Radiographs Mad With Masking Techniques.** H. K. Herglotz. *Nondestructive Testing*, v. 15, Nov.-Dec. 1957, p. 356-458.

Uniform film exposure can be obtained behind samples of constant thickness but composed of different layers of Al and uranyl nitrate solution.

4279* (Czech.) X-Ray Method of Stress Determination in Metals. **Rentgenograficzne metody pomiaru naprężeń w metalach.** Z. Ziołowski. *Prace Instytutów Ministerstwa Hutnictwa*, 1957, no. 5, p. 203-225.

Methods of X-ray determination of main stresses and their directions. A modified method of "oblique screened photographs" makes possible a rapid and simple determination of the sign and the magnitude of stress components directly from one X-ray diagram.

4280* (Czech.) Leakage Detector for Gas Pipe-Lines. **Aparat do wykrywania nieszczelności rurociagów gazowych.** T. Pawlikowski and Z. Bojenko. *Prace Instytutów Ministerstwa Hutnictwa*, 1957, no. 5, p. 236-240.

Design, operation, results, sensitivity, and accuracy.

4281* (French.) Evaluation of Quality of Boron Steels, in Particular by Micrography. **Évaluation de la qualité des aciers au bore notamment par voie micrographique.** P.-A. Jacquet and R. Capelle. *Revue de Métallurgie*, v. 54, no. 11, Nov. 1957, p. 855-866.

Inspection method to distinguish between steels improved by addition of boron, and steels the hardenability and mechanical properties of which remain practically unchanged. Study of the mechanism of the action of boron.

4282* (German.) Experience With the Ultrasonic Tests of Welded Seams. **Erfahrungen mit der Ultraschall-Prüfung von Schweissnähten.** René Hornung. *Schweisstechnik*, v. 11, no. 9, Sept. 1957, p. 103-106.

The advantages of the ultrasonic methods are: the over-all length of the welding seam is checked faster and with a higher degree of safety; the depth of error can be determined; can be easily used on assembly stands for bridges, compressed-air lines, etc; high sensitivity for cracks; relatively low cost.

4283 Leak Prevention—Through In-Process Leak Detection. Richard P. Turner. *Welding Journal*, v. 36, Dec. 1957, p. 1167-1171.

Use of fluorescent penetrants and fluorescent additives for leak detection.

4284 X-Ray Diffraction for Residual Stress Measurements of Restrained Weldments. E. H. Kinelski and J. A. Berger. *Welding Journal*, v. 36, Dec. 1957, p. 513s-517s.

Theoretical and experimental studies indicate that the use of X-ray diffraction by the two-exposure method is an excellent tool for the measurement of residual stresses in welded Monel.

See also: **4142** (hardness-tensile relationship for 7075 Al alloy).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

4285* (Ukranian.) On the Stability of a Plasma. **Ob ustoichivosti plazmy.** Iu. O. Tserkovnikov. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 461-465.

The stability of a heterogeneous plasma in a powerful magnetic field. The density of the plasma, its temperature and the magnetic field are regarded as the given functions of the coordinates and considered as the parameters on which the plasma stability depends.

4286 Long-Lived Circulating Activity in the Army Package Power Reactor. W. J. Small, J. L. Zegger, and A. L. Medin. *Alco Products, Inc. (U. S. Atomic Energy Commission)*, APAE-20, Aug. 1957, 33 p. (UF767 Un3.1apa Contin.)

Cobalt^{58,60}, Fe^{59,55}, Mn^{54}, and Cr^{51} account for approximately 80% of the long-lived activity. An (n-p) product, Co^{59}, has four times the activity of the highest activity produced by an (n-γ) reaction, Fe^{59}, at the end of 700 equivalent full power hrs.

4287 Experiment on the Reflection and Absorption of Neutrons. R. J. Stephenson and T. F. Samsel. *American Journal of Physics*, v. 25, Dec. 1957, p. 632-635.

Fast neutrons from a Ra-Be source were slowed down in paraffin and detected by a BF_3 proportional counter. The absorption of the neutrons in Al and their reflection by paraffin blocks were measured using electronic amplifying and counting equipment.

4288 Two-Nucleon Forces and Nuclear Saturation. Robert Karplus and Kenneth M. Watson. *American Journal of Physics*, v. 25, Dec. 1957, p. 641-647.

Review of evidence that observed proton-proton, proton-neutron, and neutron-neutron forces lead to stable atomic nuclei whose density is independent of their size.

4289 The Physical Description of Elementary Particles. H. Pierre Noyes. *American Scientist*, v. 45, Dec. 1957, p. 431-448.

A non-mathematical account of the development of current theories concerning the "reality" of matter.

4290* Application of a Mechanical Rectifier to a Cyclotron. Jack Warren. *Applications and Industry*, 1957, no. 33, Nov., p. 273-277.

4291 Hazards Summary Report on the Oxide Critical Experiments. W. C. Redman, J. A. Thie, and L. R. Dates. *Argonne National Laboratory (U. S. Atomic Energy Commission)* ANL-5715, Apr. 1957, 86 p. (UF767 Un3.1an Contin.)

Details of new zero-power reactor facility, designated as ZPR-VII, as it will be used in the oxide-heavy water critical program.

4292 The Coupled Aspects of a Fast-Thermal Critical: ZPR-V. B. J. Toppel. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5775, Oct. 1957, 20 p. (UF767 Un3.1an Contin.)

ZPR-V is a zero-power, coupled, fast-thermal critical assembly involving a dilute fast core and a light water-moderated, enriched U thermal annulus. The two regions are coupled through a natural U isolation blanket. Important parameters of the coupling concept are division of reactivity and relative number of neutrons emitted per unit time due to fast and slow fissions.

4293 Hazard Summary Report on the Experimental Boiling Water Reactor (EBWR). J. M. West, et al. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5781, 1957, 226 p. (UF767 Un3.1an Contin.)

Description of reactor facility and its operating procedure. Enumeration and evaluation of possible hazards.

4294 Atomic Energy Facts. 216 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (TK9145 Un3.1a)

A collection of data on the organization and functions of the AEC, production of U and Th, power and research reactors, fuel cycles, reactor materials, and radioisotopes.

4295 Atomic Power for Peace. v. III. Radioisotopes and Tracers in Industry, Agriculture, Meteorology, and Medicine. W. J. Vogt. 2nd Ed. 128 p. 1957. Atomic Power Review, Johannesburg, Union of South Africa. (TK9400 V86r)

Numerous applications are described.

4296* A Low Cost Research Reactor. *Atomics & Nuclear Energy*, v. 8, Dec. 1957, p. 463-466.

The AGN-201 research reactor is a compact, low-cost instrument which should prove valuable for work in education, research, medical diagnosis, and process control.

4297* (English.) **Developments in the Field of Power Reactors.** A. J. Salmon. *Atomkernenergie*, v. 2, nos. 8-9, Aug.-Sept. 1957, p. 288-294.

Describes the particular problems which face reactor designers and surveys the present state of world-wide nuclear power development.

4298* (German.) Safety Precautions Aboard a Nuclear Energy Powered Tanker. **Sicherheitsbedingungen an Bord eines mit Kernenergie betriebenen Tankers.** André Ertaud. *Atomkernenergie*, v. 2, nos. 8-9, Aug.-Sept. 1957, p. 299-303.

4299* (German.) Analysis of Radiation Resistivity of Reactor Building Materials. **Untersuchung der Strahlenfestigkeit von Reaktorstoffen.** P. Müller. *Atomkernenergie*, v. 2, nos. 8-9, Aug.-Sept. 1957, p. 312-315.

The following tasks are suggested: determination of all factors affecting the resistance of materials to radiation, preparation of exact data on the extent of the expected changes in the properties of materials, preparation of the data needed for computing the effective power of reactors, development of materials with higher resistivity to radiation, and search for the best methods for producing such materials.

4300* (German.) Technical Aspects of Ship Motors With Gas Turbines Driven by Nuclear Energy. **Technische Überlegungen zu Kernenergie-Schiffsantriebsanlangen mit Gasturbinen.** K. Illies. *Atomkernenergie*, v. 2, no. 10, Oct. 1957, p. 368-376.

4301* (German.) Ship Driving Mechanism With Closed Gas Turbines and Gas-Cooled Reactors. **Schiffsantrieb mit geschlossenen Gasturbinen und gasgekühlten Reaktoren.** K. Bammert. *Atomkernenergie*, v. 2, no. 10, Oct. 1957, p. 381-384.

Report on the most recent project for building a 20,000 HP Ship driving motor with a high-temperature reactor.

4302* (German.) Special Nuclear Reactors for Ships. **Spezielle Kernreaktoren für Schiffe.** W. Junkermann. *Atomkernenergie*, v. 2, no. 10, Oct. 1957, p. 385-390.

4303* (German.) Heat-Transfer Coefficients in Homogeneous Reactors With Inner Heat Exchangers. **Wärmeübergangszahlen bei homogenen Reaktoren mit innerem Wärmetauscher.** J. Clauss and K. H. Höcker. *Atomkernenergie*, v. 2, no. 10, Oct. 1957, p. 397-400.

4304* (Russian.) Development of Atomic Power in USSR. **Razvitie atomnoi energetiki v Sovetskom Soiuze.** N. A. Nikolaev. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 385-390.

Describes working principles of existing atomic power stations (since 1954) and stations under construction, comparing their efficiency with other types of power stations.

4305* (Russian.) Uranium-Graphite Superheated-Steam-Power Station Reactors. **Uran-grafitovye reaktory elektrostantsii s peregrevom para.** N. A. Dollezhal'. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 391-397 + 1 plate.

Diagrams, theoretical principles, and description of projected U-graphite reactor.

4306* (Russian.) Graphite in Reactor Construction. **Grafit v reaktorostroenii.** V. V. Goncharov. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 398-408.

Physical-chemical requirements of the graphite used in nuclear reactors. Production; effect of irradiation.

4307* (Russian.) Efficiency of Atomic Power Installations. **Effektivnyi koeffitsient poleznogo deistviia atomnoi energeticheskoi ustanovki.** I. I. Novikov. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 409-412.

Comparative theoretical study of steam and nuclear power installations.

4308* (Russian.) Physics of High Energy Particles Made in the Synchro-Cyclotron at the Nuclear Problems Laboratory of the United Nuclear Research Institute. **Issledovaniia po fizike chastits vysokikh energii na sinkhrotsiklotrone laboratorii iadernykh problem ob'edinennogo instituta iadernykh issledovanii.** V. P. Dzhelepov and B. M. Pontekorvo. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 413-443 + 13 plates.

Review of work with high energy particles in large synchrocyclotron.

4309* (Russian.) Soviet Radiochemistry. **Sovetskaia radiokhimiia.** A. N. Murin. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 459-464.

Review of work in radiochemistry accomplished by Russian scientists in the last half century.

4310* (Russian.) Application of Radioisotopes in the USSR. **Primenenie radioaktivnykh izotopov v SSSR.** G. V. Kurdiumov, M. B. Neiman, and G. M. Frank. *Atomnaia Energiia*, v. 3, no. 11, Nov. 1957, p. 465-478 + 1 plate.

Reviews uses of radioactive isotopes in metallurgy, industry, medicine, and biology in the USSR during the last 50 yrs.

4311* (German.) Natural and Artificial Radiation Exposure. **Natürliche und künstliche Strahlenbelastung.** Ludwig Ferd. Franzen, Günter Muszynski, and Günter Wiesenack. *Atomwirtschaft*, v. 11, Nov. 1957, p. 362-366.

Type and extent of present exposure to natural and artifical radiation as shown in the most recent technical literature is reviewed.

4312 Supplementary Model Studies of Flow Distribution in the Core of the PWR Reactor. Lawrence J. Flanigan and Herbert R. Hazard. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1229, Oct. 1957, 32 p. (UF767 U3b Contin.)

Air-flow studies were run to determine distribution of flow throughout the core with three configurations of the core and flow baffle. Flow distribution with the flow baffle was considerably better than that without the flow baffle.

4313 A Simulation Study of a Reflector Control System for a Heterogeneous Boiling Reactor. Benjamin B. Gordon, J. James Stone, Jr., and Roger S. Boyd. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1236, Nov. 1957, 24 p. (UF767 U3b Contin.)

A study was made of the feasibility of the system. Reactor kinetics, reactivity, and steam generation were simulated electronically while the hydraulic portion of the reector system was represented by a full-scale physical mock-up. Studies show the system to be feasible.

4314 Reactor Physics and Mathematics. *Bettis Technical Review (U. S. Atomic Energy Commission)*, v. 1, Oct. 1957, 113 p. (UF767 Un3.1wa Contin.)

Reports recent technology developments in work for the AEC at the Bettis plant.

4315 The Preliminary Design of the Liquid Metal Fuel Reactor Experiment. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-3247, Apr. 1956, 136 p. (UF767 Un3.1bn Contin.)

Only one type, the thermal reactor with solution fuel, (U in liquid Bi) externally air cooled, is considered in this preliminary design.

4316 Reactions Between LMFR Fuel and Its Container Materials. W. E. Miller and J. R. Weeks. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-2913, May 1956, 34 p. (UF767 Un3.1bn Contin.)

Zirconium dissolved in liquid Bi will prevent reaction of U or Nd dissolved in Bi with graphite to form carbides at elevated temperatures. Zirconium preferentially reacts with the graphite to form an adherant deposit of ZrC, probably containing some ZrN in solid solution.

4317 Liquid Metal Fuel Reactor. In-Pile Fuel Processing Loop (Loop B). Construction, Operation, Experimental Results. C. J. Raseman, H. Susskind, and C. H. Waide. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-403 (T-88), Jan. 1957, 40 p. (UF767 Un3.1bn Contin.)

A molten solution of natural U in Bi at 500 C was circulated through the Brookhaven reactor in a type 347 stainless steel system. The U-Bi stream leaving the reactor was equilibrated with He gas and fused salts to determine distribution coefficients for certain fission products between metal and salt and metal and gas phases.

4318 Elementary Particles and Weak Interactions. T. D. Lee and C. N. Yang. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-443 (T-91), Oct. 1957, 61 p. (UF767 Un3.1bn Contin.)

Reviews some general patterns of the interactions between various elementary particles; considers some general questions concerning the symmetry properties of these particles.

4319 Monitoring the MTR Canal Gamma Source. A Treatment of Reliability. J. G. Carroll. *California Research Corporation (U. S. Atomic Energy Commission)*, AECU-3565, Aug. 1957, 15 p. (UF767 U3au Contin.)

Procedures used in monitoring and in processing the monitoring data.

4320 Neutron Capture Gamma Rays From Lithium, Boron, and Nitrogen. G. A. Bartholomew and P. J. Campion. *Canadian Journal of Physics*, v. 35, Dec. 1957, p. 1347-1360.

Estimates of thermal neutron radiative capture cross sections are: Li^6, 0.028 ± 0.008 b.; B^{10}, 0.5 ± 0.2 b.; and N^{14}, 0.08 ± 0.02 b.

4321 Neutron Capture Gamma Rays From Fluorine, Magnesium, Gallium, Bromine, and Hafnium. P. J. Campion and G. A. Bartholomew. *Canadian Journal of Physics*, v. 35, Dec. 1957, p. 1361-1379.

Neutron capture γ-ray spectra in the energy range above three m.e.v.

4322 Development of a Thermal-Neutron Flux-Measuring Instrument. C. V. Weaver, C. K. Smith, and J. W. Chastain. *Communication and Electronics*, 1957, Nov., p. 573-577.

Instrument measures thermal-neutron flux directly and automatically. Measurements are nearly independent of gamma flux and ambient temperature. Method depends upon balancing the temperatures of an electrically-heated balancing element and a fission-heated uranium-fueled sensing element.

4323 Safety Systems for Nuclear Power Reactors. I. M. Jacobs. *Communication and Electronics*, 1957, Nov., p. 670-673.

A comparative analysis of several safety system arrangements viewed from both a mathematical and operational standpoint.

4324* (French.) The β Spectrum of RaD. A Study of Direct Transition Towards the Fundamental State of RaE. **La spectre du RaD. Etude de la transition directe vers l'etat fondamental du RaE.** Jean Tousset and Andre Moussa. *Comptes Rendus*, v. 245, no. 19, Nov. 4, 1957, p. 1617-1620.

A double focusing spectrometer study. The separation of the spectra of RaD and RaE occurred when the growth of RaE was observed in a source that had just been separated. Maximum energy of the spectrum, 61 k.e.v., in 19 ± 4% of the disintegrations.

4325 Control Over Source and Special Nuclear Material. *Division of Nuclear Materials Management and New York Operations Office (U. S. Atomic Energy Commission)*, TID-7537, pt. 1, Mar. 1957, 105 p. (UF767 Un3ti Contin.)

Symposium tells of AEC experience in the control of materials which it uses.

4326* (Russian.) Yield of Neutrons by Various Radon Sources: Rn+B, Rn+C, Rn+CaF_2, Rn+Mg, Rn+Al, Rn+Si, Rn+SiO_2, and Rn + Granite. **Vykhod neitronov iz istochnikov: Rn+B, Rn+C, Rn+CaF_2, Rn+Mg, Rn+Al, Rn+Si, Rn+SiO_2, Rn + granit.** G. V. Gorshkov and V. I. Matvienko. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 211-212.

Preparation of randon sources; two methods of measurement of yield of number of neutrons, and results of investigation of yields and other values, characterizing neutron radon sources.

4327* (German.) Nuclear Properties and Two-Body Powers. **Kerneigenschaften und Zweikörperkräfte. I.** Nuclear-Physical Models. **Kernphysikalische Modelle.** K. Wildermuth. *Fortschritte der Physik*, v. 5, no. 9, 1957, p. 421-468.

Discusses the question of whether in nuclear physics the reciprocal action of many nuclei is due to a superposition of two-nuclei interactions, or in other words, to what extent nuclear properties may be attributed to two-body energy.

4328 Design and Operation of a Sodium-to-Lithium-to-Air Heat Transfer System. A. R. Crocker, et al. *General Electric, Atomic Products Division (U. S. Atomic Energy Commission)*, APEX 327, Aug. 1957, 195 p. (UF767 Un3.1ap Contin.)

Details of a 50-gal. per min. liquid-metal circulating system.

4329 Plutonium-Aluminum Fuel Element Development. M. D. Freshley. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-52457, Sept. 1957, 44 p. (UF767 Un3.1hw Contin.)

Techniques and facilities for handling Pu at several laboratories. A tentative Al-Pu phase diagram for compositions ranging from 50 to 100 at.% Al. The Hanford plutonium recycle program. Fuel element experience.

4330 The Industrial Challenge of Nuclear Energy. 288 p. 1957. Organisation for European Economic Co-operation, Paris. (HD9698 Or3.2i)

Papers given during the first Information Conference on Nuclear Energy for Management cover the technical, economic, and industrial aspects of nuclear energy and industrial uses of radioisotopes.

4331 The Future of Nuclear Power. J. V. Dunworth. *Institution of Gas Engineers, Copyright Publication No.* 513, 1957, 21 p. (TP700 In7.3c Vis.)

Emphasizes that only two technologies have been developed in detail: gas-cooled graphite-moderated, and pressurized water plants.

4332* Control of Nuclear Reactors. L. W. J. Newman. *Joint Nuclear Marine Propulsion Panel, Journal*, 1957, no. 2, Oct., p. 21-23.

Defines the problems associated with the control of nuclear reactors, indicates briefly some of the methods of solving them, and finally describes in some detail a system of control which is to be installed in the E.443 (Dido) reactor and the R.E.775 (Pluto) reactor. The treatment is non-mathematical and intended for general interest rather than for the specialist control engineer.

4333 Lattice Constants of Separated Lithium Isotopes. E. J. Covington and D. J. Montgomery. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1030-1032.

The lattice constant for highly enriched (> 99%) samples of Li^6 and Li^7 metal was determined at 200 C by X-ray diffraction methods. The constant for Li^6 was found to be fractionally larger than that for Li^7 by about 4×10^{-4}.

4334 Bulk Density of Separated Lithium Isotopes. D. D. Snyder and D. J. Montgomery. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1033-1034.

The bulk density of extruded specimens of natural Li and of enriched isotopes (>99%) was measured by the flotation-equilibrium and by the hydrostatic-balance methods. Upon correction for the slight chemical and isotopic impurities and upon reduction to 20 C, the following results were obtained for the bulk density in g/cm^3; Li-6, 0.460 ± 0.002; Li-7, 0.537 ± 0.003; Li-natural, 0.531 ± 0.001.

4335 Computation of Rigid Asymmetric Rotator Constants From Energy Moments. L. Carlton Brown and Paul M. Parker. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1108-1110.

The procedure in many cases permits the computation of rotational constants with much less effort than is usually met in either numerical approximation to roots to secular equations of perturbation methods.

4336* (German.) Radiation Damage in Solids. **Strahlungsschäden in festen Körpern.** Wilhelm Sander. *Naturwissenschaften*, v. 44, no. 19, Oct. 1957, p. 504-506.

Experimental methods and types of dislocation due to radiation. Study of the Frenkel dislocation in metals; formation energy, effect on the electric resistance. Energy liberated by correction of the dislocation. Effect of radiation in alloys, semiconductors, and polymerized substances.

4337 The Theoretical Calculation of the Attenuation of Gamma Radiation From a Swimming Pool Type Reactor. R. L. Ashley and D. S. Duncan. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1921, Aug. 1957, 40 p. (UF767 Un3.1na Contin.)

Shielding problems on such reactor systems as the SRE and OMRE are solved by comparing the results with those from the Oak Ridge Bulk Shielding Reactor.

4338 The Neutron Velocity Spectrum in a Heavy Moderator. E. Richard Cohen. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1940, Oct. 1957, 39 p. (UF767 Un3.1na Contin.)

The differential equation developed by Wilkins is investigated for the case of 1/v absorption.

4339 Absolute Thermal Neutron Determination. III. Absolute Thermal Neutron Flux. Moses A. Greenfield, Roscoe L. Koontz, and Alan A. Jarrett. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1137, Nov. 1957, 13 p. (UF767 Un3.1na Contin.)

Method is based on a determination of the absolute specific disintegration rate in In foils in a windowless proportional counter with 2π geometry. By combining data on the absolute disintegration rate of activated In foils with appropriate corrections for neutron effects, the thermal flux is expressed in terms of the known thermal absorption cross section of In^{116}.

4340 Low Frequency Induction Heating Design for the Organic Moderated Reactor Experiment. R. B. Hall and A. M. Elmore. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-2005, Nov. 1957, 30 p. (UF767 Un3.1na Contin.)

To provide a low cost and reliable electrical preheating system, a 60-cycle induction heating scheme was used.

4341* Inelastic Scattering of 185 MeV Protons on Oxygen, Calcium and Carbon. H. Tyrén and Th. A. J. Maris. *Nuclear Physics*, v. 4, Nov. 1957, p. 637-642.

Energy spectra at various angles for the inelastic scattering of protons near 180 m.e.v. measured with a magnetic analyzer.

4342* Polarization of High Energy Protons in Elastic and Inelastic Scattering. Peter Hillman, A. Johansson, and H. Tyrén. *Nuclear Physics*, v. 4, Nov. 1957, p. 648-661.

The polarizations of 173-177 m.e.v. protons inelastically and elastically scattered by C, O, and Ca were measured with an energy resolution of 2-2.5 m.e.v. full-width at half-height

equivalent. The polarizations of scattered protons corresponding to the low-lying levels of all three elements are large and show strikingly similar angular patterns.

4343* Parity Violation in β-Decay. Correlation of the Electron Direction With the Polarisation of a Subsequently Emitted Neutron. G. A. Jones and F. Mandl. *Nuclear Physics*, v. 4, Nov. 1957, p. 690-692.

4344* Irradiation for Industry. H. C. Tresise, S. Stein, D. S. Beard, Denis Taylor, and S. Jefferson. *Nuclear Power*, v. 2, Dec. 1957, p. 492-516.

A series of nine articles devoted to techniques, machines, instruments, and technology associated with industrial processing by means of penetrating radiations.

4345 Instrumentation in Aircraft for Radiation Measurements. F. J. Davis and P. W. Reinhardt. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 713-727.

Description of a six crystal, NaI scintillation γ-ray detector. The variation of radiation with height above ground in the neighborhood of 500 ft. can be adequately expressed by use of a buildup factor which varies proportionately with height.

4346 Stored Energy in Neutron-Bombarded Graphite. T. J. Neubert and R. B. Lees. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 748-767.

Data shows the dependence of energy storage upon extent and temperature of bombardment. It is suggested that annealing of irradiated graphite causes much of the interstitial material to reintegrate with the graphite lattice by filling lattice vacancies.

4347 The Interaction of 0.15- to 1.0-Mev Neutrons With U-238, U-235, and Pu-239. Robert C. Allen. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 787-793.

4348 The Aircraft Reactor Experiment. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 797-853.

Four papers on molten fluoride fuels, design and construction, physics, and operation.

4349 Fuel Reprocessing Series. II. Low-Decontamination and Volatility Methods. Edward L. Anderson, Jr. *Nucleonics*, v. 15, Dec. 1957, p. 44-49.

Volatility processes achieve high decontamination, are based on the differences in volatility of the U, Pu, and fission-product fluorides. Low-decontamination processes have as their objective the purification of reactor fuels only to a level suitable for reactor recycling.

4350 Remote Fuel Fabrication—How It Was Done for EBR-II. Arthur S. Shuck. *Nucleonics*, v. 15, Dec. 1957, p. 50-53.

Remote-controlled methods of reprocessing and refabricating U-alloy fuel rods.

4351 Fission-Product Monitoring in Reactor Coolant Water. R. L. Heath. *Nucleonics*, v. 15, Dec. 1957, p. 54-58.

Monitor uses continuous isolation of fission-product iodine by ion-exchange resins and γ energy discrimination and thus responds essentially only to 86-sec. I^{136}, 54-min. I^{134}, and 6.7-hr. I^{135}.

4352 Reactor Water Processing. How It Is Done in APPR. A. Louis Medin. *Nucleonics*, v. 15, Dec. 1957, p. 72 + 5 pages.

4353* (French.) Statistical Theory of the Calculation of Alpha Particles Emitted by Successive Disintegrations of Radioactive Elements. **Théorie statistique du comptage de particules alpha émises par des désintégrations successives d'éléments radioatifs.** M. Huybrechts. *Nuovo Cimento*, v. 6, ser. 10, no. 4, Oct. 1957, p. 811-831.

The distribution of the number of α-particles, recorded by means of a meter placed on a radioactive source, was found to be asymptotically Gaussian. A method of calculation is described and its results applied to the U and Th families.

4354* (English.) **Dispersion Relations for Heavy Meson-Nucleon Interaction in a Fixed Source Theory. I.** D. Amati and B. Vitale. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1013-1026.

4355* (English.) **The Binding Energy of Sigma Hyperons With Nucleons.** F. Ferrari and L. Fonda. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1027-1033.

The binding of Σ hyperons with single nucleons is discussed assuming that the interaction takes place either through pions, or K-mesons or both. In order to obtain a bound system, the most reasonable assumption is to consider both the pion- and the K- forces.

4356* (English.) **On the Quantization of Tensor Fields With Zero Mass.** C. G. Bollini. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1034-1039.

A general formulation of quantum field theory for massless tensor fields, compatible with the supplementary conditions. The free field is expressed in terms of its components along the transversal polarization tensors defined. These components are taken as canonical coordinates, on which the canonical commutation relations are imposed.

4357* (English.) **General Theory of Particle Mixtures.** Ko Aizu. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1040-1051.

The Weisskopf and Wigner theory of decaying systems was extended to the cases where the initial state is fully or nearly degenerate. The existence and the remarkable time behavior of particle mixtures in contrast with the usual β or γ decay in nuclear physics are natural consequences of the degeneracy.

4358* (English.) **The 24 Hour Intensity Variations of the Primary Cosmic Rays.** A. M. Conforto and J. A. Simpson. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1052-1063.

The data from nucleonic component detectors are analyzed for the amplitude and phase of maximum intensity of the 24 hr. variation at the geomagnetic equator and at 48° N. The same analysis is performed on selected charged-particle detectors.

4359* (English.) **On the Mean Life of μ-Mesons in Elements of Medium and High Atomic Number.** A. Alberigi-Quaranta and F. Pieraccini. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1084-1101.

The deflection of the trajectory of a cosmic ray μ-meson passing through two magnetized iron blocks was measured by a hodoscope of 90 Geiger counters. A fast syncroscope determined the interval of time between the arrival of the meson and its disappearance in the absorbers.

4360* (Italian.) Diffusion of Radioactive Elements of the Th Family in Nuclear Emulsions. **Diffusione di radioelementi della famiglia del Th nelle emulsioni nucleari.** N. Marongiu. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1102-1105.

Description of a new case of diffusion of radioactive atoms in nuclear emulsions. The phenomenal characteristics of the case prove the particular importance of the plate's treatment in relation with migration of radioactive atoms of various kinds.

4361* (French.) Renormalization of a Parity Non-Conserving Theory. **Renormalisation d'une théorie ne conservant pas la parité.** B. d'Espagnat and J. Prentki. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1129-1134.

A parity non-conserving, but CP invariant, nucleon-hyperon-K interaction is postulated. In the proposed renormalization procedure a real physical nucleon still has a definite parity with respect to the base nucleon.

4362* (English.) **On the *Q*-Values of the Λ^0 and the θ^0 and on the Anomalous V^0-Decays.** C. D'Andlau, et al. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1135-1154.

A study of 161 V^0-dacys in a momentum chamber gives no direct evidence for anomalous neutral hyperon decays. Upper limits (6 to 8%) can be placed on the existence of various hypothetical modes.

4363* (English.) **A Multiplate Cloud Chamber Study of Unstable Particles.** M. Annis, N. F. Harmon, and R. D. Sard. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1155-1167 + 4 plates.

The distribution of scattering angles of penetrating secondaries was used to determine the exponent of their differential momentum spectrum and the noise level of the chamber.

4364* (English.) **Production of Strange Particles by 4.3 GeV π^- in Emulsion.** C. Besson, et al. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1168-1188.

4365* (English.) **Effect of the Spin-Orbit Potential on the Magnetic Moment of the Deuteron.** J. J. Swart, R. E. Marshak, and P. S. Signell. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1189-1192.

4366* (English.) **Hilbert Spaces in Quantum Field Theories.** S. Albertoni and F. Duimio. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1193-1205.

Examines the structure of the Hilbert space spanned by the states of a quantized field. A hypothesis is made concerning the possibility of a physical interpretation of various subspaces.

4367* (English.) **A p,γ Coincidence Method for the Measurement of π^0 Photoproduction.** W. John and G. Stoppini. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1206-1210.

A method to measure differential cross-sections for photoproduction of neutral pions from H below 260 m.e.v. incident photon energies. Some cross-sections measured at 90° in the center of mass are presented.

4368* (English.) **The Behaviour of Phase-Sensitive Detectors.** M. B. Palma-Vittorelli, M. U. Palma, and D. Palumbo. *Nuovo Cimento*, v. 6, ser. 10, no. 5, Nov. 1957, p. 1211-1220.

An analysis of the output of different types of phase detectors for any given input. Expressions are given for the frequencies present in the output and for the related amplitudes and phases.

4369 Nuclear Structure Effects in Internal Conversion. T. A. Green and M. E. Rose. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2395, Nov. 1957, 131 p. (UF767 U30 Contin.)

Effects of nuclear structure on the conversion coefficients for pure 2^L-pole transitions.

4370 Fuel Costs in Single-Region Homogeneous Power Reactors. P. R. Kasten, T. B. Fowler, and M. P. Lietzke. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2341, Dec. 1957, 58 p. (UF767 U30 Contin.)

Fuel costs based on non-steady-state conditions are less sensitive to increases in fuel-cycle time than are fuel costs based on equilibrium conditions.

4371 Scattering of Polarized Positrons by Polarized Electrons. J. M. C. Scott. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1472-1474.

Scattering cross sections are calculated.

4372 (English.) **The Decay of ^{90}Nb.** Raymond K. Sheline. *Physica*, v. 23, Oct. 1957, p. 923-942.

^{90}Nb produced by the (p,n) reaction on separated ^{90}Zr was studied by scintillation β and γ spectroscopic methods.

4373 Angular Correlation of Positron Annihilation in Teflon. S. D. Warshaw. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 713-715.

The angular correlation of the 2-quantum decay of positrons annihilating in a Teflon absorber was measured at room temperature and at 490 K, in each case with a magnetic field of 10 kilogauss and in the absence of the field.

4374 Nonelastic Neutron Cross Sections at 14 Mev. Malcolm H. MacGregor, William P. Ball, and Rex Booth. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 726-734.

Nonelastic neutron cross sections for 23 elements were measured at 14.2 m.e.v. by means of the sphere transmission technique. Corrections were applied to the data, principally for elastic energy loss, multiple scattering, and finite detector size.

4375 Experimental Survey of Nuclear Transformations Caused by 2-Mev Lithium Ions. E. Norbeck, Jr. and C. S. Littlejohn. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 754-759.

Ion beams of Li^6 or Li^7 were used to bombard targets of Li, Be, and C.

4376 Analysis of Elastic Scattering and Polarization of 300-Mev Protons. F. Bjorklund, I. Blandford, and S. Fernbach. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 795-799.

Optical-model calculations were carried out on an IBM-704 computer for 300-m.e.v. protons incident on various nuclei. Differential cross sections and polarization curves were compared with existing experimental data.

4377 Radioactive Decays of Au^{194}, Au^{195}, and Au^{199}. David E. Alburger. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 812-816.

4378 Production of Λ^0 Particles in Lead and Carbon by 2.5-Bev Protons. E. R. Mosburg, Jr., E. C. Fowler, and H. L. Kraybill. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 865-871.

4379 ψ Superposition and Quantum Periodicity. Alfred Landé. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 891-893.

The superposition law for probability amplitudes, usually considered as an empirical rule and introduced into the quantum theory as an *ad hoc* assumption, is shown to be the mathematical solution of almost self-evident requirements for the structural metric of the probabilities in general.

4380 Nuclear Spectroscopy of Neutron-Deficient Rare Earths (Tb Through Hf). J. W. Mihelich, B. Harmatz, and T. H. Handley. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 989-999.

4381 Differential Cross Section for 3.7-Mev Neutrons Scattered From Zirconium and Molybdenum. H. S. Hans and S. C. Snowdon. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1028-1031.

4382 Photon Scattering From Protons and Deuterons. R. H. Capps. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1032-1035.

The scattering of dipole photons of 100 to 200 m.e.v. from protons and deuterons is calculated by means of dispersion relations, experimental data on photopion production from nucleons, and several reasonable approximations.

4383 Production of *V* Particles by 3-Bev Protons. R. L. Cool, T. W. Morris, R. R. Rau, A. M. Thorndike, and W. L. Whittemore. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1048-1052.

The rarity of such events leads to the conclusion that the *V*-production cross section is probably less than 0.2 mb.

4384 Mass Spectrometric Studies of the Interaction of Gold With 3.0-Bev Protons. B. M. Gordon and L. Friedman. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1053-1057.

Gold targets were irradiated and the yields of Cs, Ba, and Rb nuclides investigated by mass spectrometry. A high-sensitivity surface-ionization technique, using a multiple filament source arrangement and capable of determining (within 5%) 10^4 alkali metal atoms, was developed.

4385 Production of Electron Pairs by 550-Mev Electrons. F. J. Loeffler. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1058-1062.

4386 New Dispersion Relations for Pion-Nucleon Scattering. Walter Gilbert. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 1078-1083.

New relations expressing the imaginary part of the scattering amplitude as a coupling constant term and an integral over the physical spectrum of the real part of the amplitude are applied to compute the meson-nucleon coupling constant from the experimental phase shifts, yielding the value $f^2=0.084$, and to compute the *s*-wave scattering lengths from the *p*-wave data.

4387 Scintillation Response of CsI(Tl) Crystals to Fission Fragments and Energy *vs* Range in Various Materials for Light and Heavy Fission Fragments. Clyde B. Fulmer. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1113-1116.

Light and heavy fragments from pile neutron fission of U^{235} were magnetically separated and scintillation pulse heights in CsI(Tl) crystals determined as a function of range in various gases and metals. Energy vs. range curves were obtained in H_2, He, air, Ar, Al, Ni, and Au.

4388 Decay Times of Fluorescent Substances Excited by High-Energy Radiation. Hartmut Kallmann and George J. Brucker. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1122-1130.

Decay times of fluorescent light emitted by organic solutions and by organic and inorganic solids when excited by high-energy radiation are determined under various experimental conditions. The pulse-height ratios for α-particle and electron excitations are also found.

4389 Fission Yields of Natural Uranium With Deuterons of 5, 10, and 13.6 Mev: Deuteron Capture and Competition With Stripping. T. T. Sugihara, P. J. Drevinsky, E. J. Troianello, and J. M. Alexander. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1264-1273.

Radiochemical yields were determined for 35 mass chains from mass numbers 72 to 159. The total fission cross sections at the three energies were found to be 3.5, 86, and 4.30 mb, respectively, by integration of the mass-distribution curve.

4390 Nuclear Charge Distribution in the Fission of Uranium and Thorium With 13.6-Mev Deuterons. J. M. Alexander and C. D. Coryell. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1274-1280.

4391 Elastic Scattering of Alpha Particles and Deuterons From Heavy Nuclei. J. R. Rees and M. B. Sampson. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1289-1293.

The angular distributions of 22 m.e.v. α-particles and 11 m.e.v. deuterons scattered elastically from Ta, Au, Bi, and U were measured at angles of 20 to 160°. In all cases the deuteron cross sections departed from the Rutherford angular dependence at smaller angles than the α-particle cross sections for the same nuclei, indicating electric breakup of the deuteron.

4392 Angular Momentum Coupling in Odd-Odd Nuclei. Sudhir P. Pandya. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1312-1314.

Some general results are derived for the odd-group model of odd-odd nuclei and used to discuss the validity of the model.

4393 Interactions of 1.3-Bev Negative Pions in Nitrogen. G. D. Gordon, R. H. Milburn, J. C. Street, and L. A. Young. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1315-1321.

Seventy-four inelastic pion-nitrogen interactions were studied using a diffusion cloud chamber provided with a magnetic field.

4394 Energy Spectrum of Charged Pions From 2.2 Bev-Protons on Be. F. L. Niemann, J. K. Bowker, W. M. Preston, and J. C. Street. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1331-1340.

4395* (English.) **Nuclear Interactions in Nucleon-Proton and Nucleon-Carbon Nucleus Collisions Above 10 GeV.** Koichi Suga. *Physical Society of Japan, Journal*, v. 12, Nov. 1957, p. 1171-1177.

4396 Progress in Nuclear Physics. O. R. Frisch, editor. v. VI. 297 p. 1957. Pergamon Press, New York. (QC776 P94 Vis.)

Isotope separation by multistage methods; nuclear models; nuclear moments and spins; spectroscopy of mesonic atoms; atomic masses; electromagnetic enrichment of stable isotopes; fission recoil and its effects; parity non-conservation in weak interactions.

4397* Nuclear Matrix Element Relations in the Fermi Theory of Beta Decay. Tino Ahrens. *Progress of Theoretical Physics*, v. 18, Oct. 1957, p. 331-344.

4398* Static Model in the Meson Theory. Masao Sugawara. *Progress of Theoretical Physics*, v. 18, Oct. 1957, p. 383-395.

A non-linear static model is constructed from the relativistic γ_5-theory, by approaching the static limit after a canonical transformation is applied to the original γ_5-Hamiltonian, with no perturbation expansion used.

4399* A Remark on the Moments of Inertia of Rotating Nuclei. Satio Hayakawa and Toshio Marumori. *Progress of Theoretical Physics*, v. 18, Oct. 1957, p. 396-404.

The quantum mechanical description of a two dimensional rotating system of particles is studied in order to elucidate the meaning of the effective moments of inertia of nuclei.

4400* Ionization Loss Near the Origin of an Electron Pair of Very High Energy. Iwao Mito and Hiroshi Ezawa. *Progress of Theoretical Physics*, v. 18, Oct. 1957, p. 437-447.

Ionization loss of negaton-positon pair is calculated as a function of their distance. This result is useful to measure the energy of a γ-ray above 10^{10} e.v. from the reduction of ionization near the origin of the created pair.

4401 Low-Rate Neutron Dosimeter. Ira L. Karp. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 902-904.

An instrument for monitoring of personnel in combined neutron and γ radiation fields is shown to record the rem dose due to fast and slow neutrons and γ-rays. It consists of a thermal neutron ionization chamber worn under the arm.

4402 Focusing Procedures for Electrostatic Accelerators. C. H. Johnson, J. P. Judish, and C. W. Snyder. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 942-948.

Ion optics for Van de Graaff accelerators are reviewed in elementary terms of geometric optics with particular reference to the Oak Ridge 3 mv. accelerator.

4403 Fusion Power. Richard F. Post. *Scientific American*, v. 197, Dec. 1957, p. 73-84.

A summary of available knowledge pertinent to the problem of utilizing the energy from reactions in which the nuclei of atoms are fused rather than split.

4404* World Progress With the Atom—Since Geneva. Ashton J. O'Donnell. *SRI, Journal*, v. 1, no. 4, 1957, p. 98-111. Report on progress being made toward development of atomic energy.

4405 Symposium on Radiation Effects on Materials. v. I. 190 p. 1957. American Society for Testing Materials, Philadelphia. (TA410 Am35sre)

Papers deal with theory, radiation facilities, mechanics of testing, fuel and graphite materials, and structural materials including organics.

4406 A Radiation-Effects Program. J. E. Whitney, E. M. Chandler, J. E. Gates, and G. D. Calkins. Paper from "Symposium on Radiation Effects on Materials". v. I. American Society for Testing Materials. 1957, p. 27-39. (TA410 Am35sre)

The various steps and procedures in a program for the study of the effects of radiation on nuclear fuels are discussed. These include inspection of the test specimens before irradiation, design of the radiation capsule, irradiation in a nuclear reactor, and inspection after irradiation. Equipment, facilities, costs, and some special problems are also considered.

4407 Twenty-Second Semiannual Report of the Atomic Energy Commission. 257 p. 1957. U. S. Government Printing Office, Washington, D. C. (UF767 Un3.1s Vis.)

Major activities in the Atomic Energy Program, January-June 1957.

4408 Bevatron Operation and Development. XII. Walter D. Hartsough. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3913, Aug. 1957, 18 p. (UF767 U3u Contin.)

Studies of π-meson and K-meson interactions were continued with counters, emulsions, and the 10-in. liquid hydrogen bubble chamber. An H-D reaction, catalyzed by μ mesons, was observed.

4409 Σ^+ Production by Λ^0 Hyperons. Frank S. Crawford, Jr. et al. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3924, Aug. 1957, 12 p. (UF767 U3u Contin.)

Two Λ^0-hyperons were observed to interact in flight with protons in a hydrogen bubble chamber. Σ^+ hyperons are produced in the interactions.

4410 Electromagnetic Structure of the Nucleon in Local-Field Theory. Geoffrey F. Chew, Robert Karplus, Stephen Gasiorowicz, and Fredrik Zachariasen. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3929, Sept. 1957, 35 p. (UF767 U3u Contin.)

The description of nucleon electromagnetic structure by local-field theory is discussed in terms of mass-spectral representations for the form factors.

4411 Spherical and Cylindrical Plutonium Critical Masses. Fred A. Kloverstrom. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4957, Sept. 1957, 17 p. (UF767 U3u Contin.)

Critical masses of σ-phase Pu cylinders of three diameters with thin metallic reflectors are reported. Critical reflector thickness measurements were made with two spherical Pu cores; the

cylindrical and spherical data are combined to yield shape factors for the spheres for U^{235} and Be reflection.

4412 Millimicrosecond Coincidence Circuit for High-Speed Counting. William A. Wenzel. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-8000, Oct. 1957, 14 p. (UF767 U3u Contin.)

The basic circuit, consisting of a pentode limiter feeding a simple Rossi-type diode coincidence circuit, is readily adaptable to a variety of uses.

4413 Nuclear Reactions of Uranium Induced by 5.7-Bev Protons; Radiochemical Yields of Light Elements. Chalon Lucius Carnahan. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-8020, Oct. 1957, 33 p. (UF767 U3u Contin.)

Formation cross sections are reported for products in the mass region $7 < A < 66$. The peak yields for each mass number were found to occur along the stability line or slightly to the neutron-excess side of it.

4414 Zirconium-Water Reaction Data and Application to PWR Loss-of-Coolant Accident. B. Lustman. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-543, May 1957, 43 p. (UF767 Un3.1wa Contin.)

4415 PWR Loss-of-Coolant Accident Core Meltdown Calculations. L. M. Swartz, A. W. Lemmon, Jr., and L. E. Hulbert. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-544, May 1957, 80 p. (UF767 Un3.1wa Contin.)

Covers the calculation of the PWR core temperature excursion which would follow an uncovering of the core because of the loss of primary coolant water.

4416 Development of Shippingport Atomic Power Station. Operating Procedures. Reuel F. Stratton. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-PWR-973, May 1957, 41 p. (UF767 Un3.1wa Contin.)

4417 Pressure Vessel and Piping Codes Applicable to the PWR Reactor Plant. J. F. Dobinsky, M. B. Andrew, and T. R. Moffette. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-PWR-974, May 1957, 13 p. (UF767 Un3.1wa Contin.)

4418 Safeguards Aspects of PWR Reactor Coolant Chemistry. W. T. Lindsay. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-546, June 1957, 20 p. (UF767 Un3.1wa Contin.)

Effect of normal water conditions on plant and core, and results of fuel element failure, release of fission products, and accidental water conditions such as high oxygen, residual decontamination reagents, and impurities.

4419 Description of Shippingport Atomic Power Station Site and Surrounding Area With Radiation Background and Meteorological Data. R. J. McAllister and W. B. Wirth. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-547, June 1957, 34 p. (UF767 Un3.1wa Contin.)

4420 PWR Plant Container Sizing Criteria Studies of Transient Temperature and Pressure in Plant Container Following Primary Coolant System Reysture. R. M. Rome and T. R. Moffette. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-549, June 1957, 34 p. (UF767 Un3.1wa Contin.)

4421 Description of the Shippingport Atomic Power Station. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-PWR-970, June 1957, 137 p. (UF767 Un3.1wa Contin.)

4422 Selection and Application of Materials for the PWR Reactor Plant. H. Mason. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-PWR-971, July 1957, 33 p. (UF767 Un3.1wa Contin.)

4423 Shippingport Atomic Power Station Inspection and Test Program. A. L. Bethel, W. H. Hirst, J. E. Nolan, and R. F. Stratton. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-PWR-972, July 1957, 47 p. (UF767 Un3.1wa Contin.)

Program will provide a means for checking the installation of material and equipment, determining the adequacy of test and operating procedures, and checking the operation of systems and equipment before and after reactor plant critical operations, as well as providing essential performance data.

4424 PWR Hazards Summary Report. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-541, Sept. 1957, 128 p. (UF767 Un3.1wa Contin.)

Contains analyses of the radiological hazards that might result from the major types of accidents that must be considered in a pressurized water reactor plant, and an explanation of how the plant is protected.

4425 Hydrogen Flammability Data and Application to PWR Loss-of-Coolant Accident. Z. M. Shapiro and T. R. Moffette. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-545, Sept. 1957, 23 p. (UF767 Un3.1wa Contin.)

4426 Hazards to the Area Surrounding PWR Due to Atmospheric Diffusion of Radioactivity. R. F. Valentine. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-SC-548, Sept. 1957, 77 p. (UF767 Un3.1wa Contin.)

General expressions for calculating radiation hazards to surrounding area; dosage calculations for release of primary coolant; calculation of dosage assuming a core meltdown.

4427 Effects of Irradiation on Bulk UO_2. J. D. Eichenberg, P. W. Frank, T. J. Kisiel, B. Lustman, and K. H. Vogel. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-183, Oct. 1957, 193 p. (UF767 Un3.1wa Contin.)

Irradiation experiments to validate use of bulk UO_2 in the PWR.

4428 PWR Fuel Element Specifications. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, TID-5302 (Rev.), 1957, 71 p. (UF767 Un3ti Contin.)

Specifications for fabrication and inspection of UO_2 compacts and fuel rods, components, and assemblies.

4429* (German.) Retarded Electron Emission and External Photoelectric Effect of Germanium After Electron Bombardment. **Verzögerte Elektronenemission und äusserer Photoeffekt von Germanium nach Elektronenbeschuss.** Karlheinz Seeger. *Zeitschrift für Physik*, v. 149, no. 4, 1957, p. 453-470.

Germanium after electron bombardment (electron energy 300 to 900 e.v.) emitted delayed electrons. Emission faded according to an exponential law. The emission was studied between 103 and 670 K.

4430* (Russian.) Scattering of Slow Neutrons in Ferromagnetics. **Rasseianie medlennykh neitronov v ferromagnetikakh.** S. V. Maleev. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 33, no. 4, 1957, p. 1010-1021.

The scattering is considered in single- and polycrystals with the use of the theory of spin waves.

See also: **3213** (biological pressure effects of nuclear detonation); **3261** (properties of UO_2); **3297** (nuclear chemical engineering); **3317** (tracer compound analysis); **3326** (determination of U^{235} by scintillation spectrometry); **3821** (economics of atomic power); **3846** (radiation effects in shock waves); **3858** (food irradiation reactor); **3885** (effects of hydrogen bomb test); **3910** (cosmic rays and Fe meteorites); **3998** (thermal stress analysis); **4007** (neutron radiation effects); **4033** (Zircaloy-clad Th fuel rods); **4118** (radiation effects in uranium); **4555** (radioactive waste disposal); **4562** radioactive fallout indicator); **4636** (liquid metals for heating and cooling).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

4431 The Dartnell Public Relations Handbook. John Cameron Aspley and L. F. Van Houten, editors. 1005 p. 1956. Dartnell Corp., Chicago. (HM263 D25d)

Concerns relationships between business and personnel, competitors, radio and TV, press, stockholders, service clubs and civic organizations, religious groups, schools, and the community in general.

4432 Dynamic Programming. Richard Bellman. 342 p. 1957. Princeton University Press, Princeton. (QA264 B41d)

An introduction to the mathematical theory of multistage decision processes. Applications to mathematical economics, logistics, scheduling theory, communication theory, control processes, and other fields.

4433 Management Development. *Factory Management and Maintenance*, v. 115, Dec. 1957, p. 91 + 31 pages.

Some practical tips for a successful plant management development program.

4434 Operations Research and Communications Systems Planning. Robert V. Higdon. *Institute of Radio Engineers, Transactions on Communications Systems*, v. CS-5, Dec. 1957, p. 20-28. (TK1 In6.6cs Vis.)

A discussion is presented outlining the general concept of operations research. Brief description is given of efforts to apply these concepts to specifying effective communications for complex organizations or weapons systems.

4435* The Role of the Industrial Engineer in Systems Design and Improvement. Arthur D. Even. *Journal of Industrial Engineering*, v. 8, Nov.-Dec. 1957, p. 370-377.

4436* Algebraic Model Helps Make Decisions on Machine Tool Replacement. Edward C. Varnum. *Tooling and Production*, v. 23, Dec. 1957, p. 77-83.

The Barber-Colman version of the MAPI formula employs an easy-to-use algebraic model to build basic tables from which a more realistic "uniform annual equivalent" is quickly determined.

See also: **3679** (use of electronic computers).

ORE AND MATERIALS BENEFICIATION

4437* (English.) **Production of Manganous Sulphate Solution Fit for Electrolysis From Úrkút Washery Slimes.** Z. Horváth. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 209-230.

Describes method for transforming Mn ore, in the form of MnO_2, to sulphate electrolyte for Mn electrolysis. Reduction of ore, cooling, and leaching are the main steps in the method.

4438* (English.) **Contribution to the Kinematics of the Hydrocyclone.** G. Tarján. *Acta Technica Academiae Scientiarum Hungaricae*, v. 18, nos. 3-4, 1957, p. 349-382.

Tangential, radial, and axial velocity components of fluid flow in the hydrocyclone, chosen on the basis of Kelsall's experiments, give a formula suitable for the calculation of the grain size of particles revolving in equilibrium at different positions in the hydrocyclone.

4439 New Process Developed for Treating Iron Ore Concentrates. *Blast Furnace and Steel Plant*, v. 45, Dec. 1957, p. 1430-1431.

Process consists of four steps; forming the pellets in a balling pan or drum, drying on a moving grate, heating (partially oxidizing) on a moving grate, and final burning of the pellets in a short rotary kiln.

4440 Electrostatic Separation of Feldspar and Other Non-Metallic Minerals. Grant S. Diamond. *Canadian Mining and Metallurgical Bulletin*, v. 50, no. 547, Nov. 1957, p. 669-673; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 367-371.

4441 The Contact Angles of Air and Nitrogen Bubbles With Synthetic Vapour-Plated Galena in the Presence and Absence of a Collector. J. H. Walsh and T. R. Ingraham. *Canadian Mining and Metallurgical Bulletin*, v. 50, no. 547, Nov. 1957, p. 674-677; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 60, 1957, p. 372-375.

Technique developed for vapor plating metallic sulfides, is useful for showing that synthetic galena has no apparent natural floatability and that O is apparently unnecessary for the attachment of a potassium ethyl xanthate collector to the surface of the synthetic mineral.

4442* (German.) Floatability of Fluorite and Barite. **Flotierbarkeit von Fluorit und Baryt. I.** Flotation With C_8-C_{12} Aliphatic Acids. **Flotation mit aliphatischen Säuren C_8-C_{12}.** B. Dobiáš. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1524-1529.

Determination of critical molarity of anion collecting agents (C_8-C_{12} aliphatic acids) for fluorite and barite; determination of high and low critical values of pH. Similar studies with caproic-polargonic-, and ε-cyclohexylidenecaproic acids.

4443 Equilibrium Distribution Data for Purex and Similar Extraction Processes. Thomas H. Siddall, III, Sidney G. Parker, and William E. Prout. *E. I. du Pont de Nemours & Co., Savannah River Laboratory Technical Division (U. S. Atomic Energy Commission)*, DP-53, July 1957, 27 p. (UF767 Un3.1dp Contin.)

Equilibrium distribution of U, Th, and HNO_3 between solutions of tri-n-butyl phosphate in kerosene and the various aqueous solutions encountered in the separation of Pu and U, and in processes for the recovery of U-235 from spent reactor fuel.

4444* (Russian.) Role of a Reducing Agent in the Sintering of Aluminum and Titanium Ores. **Rol' vosstanovitelia v protsessakh spekaniia aliuminievykh i titanovykh rud.** E. I. Khazanov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1957, no. 10, Oct., p. 55-60.

Method of processing Al ores by sintering in the presence of reducing agents. Application in processing Ti concentrates.

4445 Separation of Zirconium & Hafnium Using Anion-Exchange Resins. II. Influence of Physical Factors. K. S. Rajan and J. Gupta. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 459-463.

The influence of some factors on the differential elution of Hf and Zr on Amberlite IRA 400 anion-exchange resin was investigated to ascertain the optimum conditions for separation.

4446* (Hungarian.) Physical Concentration of Manganese Carbonate Ores. **Karbonátos mangánére fizikai dúsítása.** Lajos Burnóczky. *Kohászati Lapok*, v. 12, no. 6, June 1957, p. 240-246.

Experiments on brown and gray Mn carbonates. Concentration by washing, roasting, and subsequent magnetic separation. Interpretation of results.

4447 Agglomeration Flotation of Manganese Ore. Ellis H. Gates. *Mining Engineering*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 208, Dec. 1957, p. 1368-1372.

4448 Uranium Recovery for Spent Fuel by Dissolution in Fused Salt and Fluorination. G. I. Cathers. *Nuclear Science and Engineering*, v. 2, Nov. 1957, p. 768-777.

Process consists of dissolution of the fuel element in a fluoride melt by hydro-fluorination at 600 to 700 C, direct fluorination with F for the production and volatilization of UF_6, with further decontamination of the product UF_6 from fission product activity being secured in a NaF absorption-desorption step.

4449* (Russian.) Conditions for Copper Removal From Zinc Concentrates at Ural Milling Plants. **Usloviia obezmezhivaniia tsinkovykh kontsentratov na ural'skikh obogatitel'nykh fabrikakh.** F. I. Nagirniak and P. F. Belykh. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 1-6.

Copper, Fe, and As as the main harmful elements in Zn concentrates. Description of the method of Cu removal.

4450* (Russian.) Lowering the Cost of Flotation Concentrates by Re-Use of Water. **Primenenie oborotnoi vody-put' k snizheniiu sebestoimosti flotatsionnykh kontsentratov.** V. K. Nuzhdin. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 7-13.

Analysis of waste water, and description of the experiment when waste water was used in preparing Cu concentrates.

4451* (Russian.) The Effect of Cyanide and Copper Sulphate on the Potential of Sulphide Minerals. **Vliianie tsianida i mednogo kuporosa na potentsial sul'fidnykh mineralov.** S. M. Iasiukevich and P. M. Solozhenkin. *Tsvetnye Metally*, v. 30, Nov. 1957, p. 13-17.

Effect on chalcopyrite, pyrite, and marmatite.

See also: **3298** (hydraulic cyclone operation).

PHYSICS

4452 Ultrasonic Pulse Technique for Measuring Acoustic Losses and Velocities of Propagation in Liquids as a Function of Temperature and Hydrostatic Pressure. H. J. McSkimin. *Acoustical Society of America, Journal*, v. 29, Nov. 1957, p. 1185-1192.

Illustrative data for CCl_4, Dow Corning DC-703 and DC-200 silicone fluids, and water.

4453 Vibrations of a Monoclinic Crystal Plate. E. G. Newman and R. D. Mindlin. *Acoustical Society of America, Journal*, v. 29, Nov. 1957, p. 1206-1218.

Detailed study of Ekstein's solution of the equations of elasticity for the case of the coupled vibrational modes of an infinite, monoclinic, quartz crystal plate with traction-free faces.

4454 (German.) Oscillation Cavitation by Short Sound Pulses. **Über schwingungskavitation bei kurzen schallimpulsen.** W. Mohr. *Acustica*, v. 7, no. 5, 1957, p. 267-277.

The cavitation process from the growth of nuclei to the proper cavitation oscillation may be analyzed on a time base by utilizing sound pulses (20 to 5000μ sec.). Cavitation is examined as a function of pulse length and intensity of sound, pulse interval, and gas content of the fluid. During growth of the nuclei the cavitation effect increases proportionally to pulse length and intensity.

4455 (German.) Ultrasonic Observations at Liquid Surfaces. **Ultraschallbeobachtungen an flüssigkeitsoberflächen.** G. Keck. *Acustica*, v. 7, no. 5, 1957, p. 310-312.

When an ultrasonic generator is lifted out of a liquid surface, it draws a column of liquid with it. Observations on such liquid columns are reported.

4456* (Ukranian.) On Some Theoretical Possibilities of Improving X-Ray Technique. **O nekotorykh printsipial'nykh vozmozhnostiakh usovershenstvovaniia rentgenotekhniki.** S. I. Tetelbaum. *Akademiia Nauk Ukrains'koi RSR, Dopovidi*, 1957, no. 5, p. 453-456.

Shows the theoretical possibility of obtaining three-dimensional images of investigated objects by means of X-rays.

4457 Conversion of Solar to Electrical Energy. G. L. Pearson. *American Journal of Physics*, v. 25, Dec. 1957, p. 591-598.

Photovoltaic device which converts solar radiation directly into electrical energy with an over-all efficiency of 11% consists of a *p-n* junction formed by gaseous diffusion near the front surface of a Si plate. A number of possible applications for this new solar energy converter are discussed.

4458* (French.) Ferrites. **Les Ferrites. II.** A. Vassiliev. *Annales de Radioélectricité*, v. 12, no. 50, Oct. 1957, p. 337-362.

Technical properties of ferrites: magnetic permeability and losses; the principal ferrite groups according to composition: Ni-Zn, Mn-Zn, Mg ferrite, and ferrites with more than two components. Applications.

4459* (French.) Study of Compression in Dense Media Based on the Radiograph of a Single Shock Wave. **Étude de la compression des milieux denses à partir de la radiographie d'une onde de choc unique.** Jean Dapoigny, Jean Kieffer, and Boris Vodar. *Comptes Rendus*, v. 245, no. 18, Oct. 28, 1957, p. 1502-1505.

A method for the study of the compression of dense media, by means of the shock wave produced by the lateral expansion of the gases of a detonating explosive. Quantitative results for methyl polymethacrylate.

4460* (French.) A Causal Interpretation of the Theory of the Hydrogen Atom by Means of the Hydrodynamic Representation of the Pauli Equation. **Interprétation causale de la théorie de l'atome d'hydrogène à l'aide de la représentation hydrodynamique de l'équation de Pauli.** Pierre Hillion. *Comptes Rendus*, v. 245, no. 19, Nov. 4, 1957, p. 1595-1597.

Physical causal interpretation of the mathematical solutions of the hydrodynamic representation of the Pauli equation. A sort of Brownian movement was superposed on the trajectories foreseen by the causal theory, yet their average physical significance was maintained.

4461* (French.) Interpretation of the Variations of the Ferrimagnetic Resonance Field of Gadolinium Garnet With Temperature. **Interprétation des variations du champ de résonance ferrimagnétique du grenat de gadolinium avec la température.** Jean Paulevé. *Comptes Rendus*, v. 245, no. 19, Nov. 4, 1957 p. 1604-1607.

Resonance of polycrystalline Gd garnet. Interpretation of branched curves determining the conditions of the resonance of garnet considered as a ferrite with two sublattices, as a function of temperature, and disregarding anisotropy.

4462 Electroluminescence of Zinc Sulfoselenide Phosphors With Copper Activator and Halide Coactivators. I. J. Hegyi, S. Larach, and R. E. Shrader. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 717-721.

4463 Electroluminescence and Field Effects in Phosphors. Henry F. Ivey. *Electrochemical Society, Journal*, v. 104, Dec. 1957, p. 740-748.

Observations may be explained by a combination of the following simple basic physical processes: field emptying of traps; field quenching of photoluminescence; acceleration-collision electroluminescence; recombination electroluminescence.

4464 (German.) Bifluid Model and Sound Absorption in Helium II. **Bifluidmodell und Schallabsorption in Helium II.** W. Czaja. *Helvetica Physica Acta*, v. 30, no. 5, 1957, p. 447-456.

Prerequisites for the bifluid model of He II; vibrations of He II in a spherical resonator; characteristic frequencies and absorption coefficients.

4465* Light Propagation in Absorbing Crystals Possessing Optical Activity. S. Pancharatnam. *Indian Academy of Sciences, Proceedings*, v. 46, sec. A, Oct. 1957, p. 280-302.

Theoretical analysis.

4466* The Properties of Manganese-Zinc Ferrites and the Physical Processes Governing Them. C. Guillaud. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Suppl., no. 5, 1957, p. 165-173.

Initial permeability is shown to depend on stoichiometry, granular structure and composition, while the temperature coefficient of permeability is controllable by the addition of small amounts of trivalent metallic impurities. The influence of composition and manufacturing conditions on the losses, Curie point, and induction is examined.

4467* Heat Changes Accompanying Magnetization Processes in Ferrites. L. F. Bates and D. A. Christoffel. *Institution of Electrical Engineers, Proceedings*, v. 104, pt. B, Suppl., no. 5, 1957, p. 231-237.

Measurements on Ni-Zn, Mn-Zn, Mg-Zn, and Li-Cr specimens. Evidence that domain boundary movements occur in low fields; in high fields rotation of domain vectors are paramount.

4468* (Russian.) Investigation of the Magnetization of Ferrites in the Curie Point Region. **Issledovanie namagnichivaniia ferritov v oblasti tachki kiuri.** K. P. Belov, K. M. Bol'shova, and T. A. Elkina. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1047-1054.

Study of Mn-Zn ferrite systems with different MnO contents between 20 and 40% and two ferrites of the Co-Zn system. True magnetization curves near the Curie temperature. Behavior of the MnZn ferrites in weak fields near the Curie point.

4469* (Russian.) Some Problems Related to the Theory of Elastic Ferromagnetic (Magnetostrictive) Media. **Nekotorye voprosy teorii uprugikh ferromagnitnykh (magnitostriktsionnykh) sred.** K. B. Vlasov. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1140-1148.

Surveys electrodynamics, elasticity theory, and state equations necessary to solve problems connected with the calculation of magneto-mechanical transformers, determining the changes in ferromagnetic bodies under the effect of a magnetic field, the mechanical stresses, and the temperature.

4470* (Russian.) Anisotropic Magnetic Cores. **Anizotropnye magnitnye serdechniki.** P. Denesh. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 8, Aug. 1957, p. 1205-1212.

Use of fine-powder cores for reducing losses. Effect of amount of insulating material on magnetic permeability. Improving the basic ferromagnetic materials.

4471* (Russian.) Temperature and Rotational Hysteresis in Ferromagnetics. **Temperaturnyi i vrashchatel'nyi eisterezis v ferromagnetikakh.** L. V. Kirenskii, et al. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 9, Sept. 1957, p. 1262-1267 + 1 plate.

Temperature hysteresis of magnetic properties including magnetostriction and galvanomagnetic effect.

4472* (Russian.) Magneto-Optical Properties of Ferromagnetics in the Infra-Red Region. **Magnitoopticheskie svoistva ferromagnetikov v infrakrasnoi oblasti.** G. S. Krinchik. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 21, no. 9, Sept. 1957, p. 1293-1296.

Effect of magnetic force on light reflection.

4473* Studies on Depolarization of Light at Microscope Lens Surfaces. II. The Simultaneous Realization of High Resolution and High Sensitivity With the Polarizing Microscope. Shinya Inoué and W. Lewis Hyde. *Journal of Biophysical and Biochemical Cytology*, v. 3, no. 6, Nov. 1957, p. 831 + 9 pages and 3 plates.

Emphasizes the advantage of observation of living cells with the polarizing microscope as a contrast with the electron microscope.

4474 Cl^{35} Pure Quadrupole Resonance Studies of Relaxation Times in Solid Solutions of *p*-Dichlorobenzene. D. E. Woessner and H. S. Gutwosky. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1072-1074.

Transient methods were used to measure the Cl^{35} nuclear relaxation times at room temperature in solid solutions of *p*-dichlorobenzene and *p*-dibromobenzene. The spin-lattice relaxation time and the phase memory time were found to be virtually independent of sample composition.

4475 Defects on a Dipole Lattice. A. Isihara. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1174-1179.

Effects of defects on dipole interactions in a simple cubic lattice are calculated using the spherical model developed by Berlin and Thomsen, Lax, and others. When the concentration of defects is small, thermodynamical functions are linearly dependent on the concentration.

4476 Mechanical Resonance Dispersion in Crystalline Polymers at Audio-Frequencies. Edwin R. Fitzgerald. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1180-1193.

Measurements of the complex shear compliance of crystalline polymers (polytetrafluoroethylene, linear polyethylene, and polyvinyl stearate) at closely spaced frequencies in the audio-frequency range resulted in the discovery of multiple frequency dispersions of the resonance type.

4477 On the Optical Properties of Solids. II. Herbert B. Rosenstock. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1194-1201.

The absorption of light by a crystal due to atomic motion is calculated by first-order perturbation theory in the approximation in which atoms are considered as charged mass points.

4478 Mass Spectroscopic Determination of Photoionization Products. Richard F. Herzog and Frederick F. Marmo. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1202-1205.

A R. F. mass spectrometer of the Bennett type was utilized to measure the mass of ions formed by photoionization of several gases by the ultra-violet radiation of H discharge. Investigations were performed up to 11.4 electron volts, the LiF cutoff.

4479 The Decay of Waves in Elastic Solids. T. Y. Thomas. *Journal of Mathematics and Mechanics*, v. 6, Nov. 1957, p. 759-768.

4480 Fizeau-Type Interference Between Beams of Light Reflected From Three Surfaces. A. H. Cook. *Journal of Scientific Instruments*, v. 34, Nov. 1957, p. 455-458.

The distinctive feature of the fringe system is that the field is crossed by bands of intensity equal to that of light reflected from one of the surfaces, delineating the lines of constant separation of the other two surfaces. Use of the phenomena in metrology is discussed.

4481* (Russian.) On the Calculation of Magnetic Properties of Molecules by the Free-Electron Model. **K raschetu magnitnykh svoistv molekul po metodu metallicheskoi modeli.** T. K. Pebane. *Leningradskogo, Universiteta, Vestnik, Seriia Fiziki i Khimii*, v. 12, no. 16, 1957, p. 19-31.

A refined method for calculation of diamagnetic anisotropy of aromatic hydrocarbons by the one-dimensional free-electron model. Detailed results obtained for the perimeter-model of aromatic hydrocarbons and for the molecules of naphthalene, heptalene and pentalene (with branching) are in agreement with those obtained by the molecular-orbital method.

4482 Vacuum Spark Plasmas. D. Finkelstein, G. A. Sawyer, and T. F. Stratton. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2077, Nov. 1957, 18 p. (UF767 U3La Contin.)

Observations of plasmas produced by sparks in vacuum are reported. Plasma speeds are much higher than the thermal speeds associated with spark temperature, varying between 2×10^6 and 2×10^7 cm/sec., and they are surprisingly independent of the spark parameters.

4483 Magnetohydrodynamics. Rolf K. M. Landshoff, editor. 115 p. 1957. Stanford University Press, Stanford, Calif. (QC809.M3 L23m)

Consists of 13 papers on the theoretical and experimental aspects of such phenomena as magnetic build-up in stars, pinch effect, magnetic shock waves and their invasion of magnetic fields, scaling laws, and the hydromagnetic wave guide.

4484* (Russian.) Investigation of the Problem of Pressure Distribution in the Depths of a Compressed Liquid. **Issledovanie zadachi a pronikanii davleniia v glub' szhimaemoi zhidkosti.** A. G. Bagdoev. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 23-29.

Mathematical analysis.

4485* (Russian.) Preparation of Dielectric Mirrors and Interference Light Filters, and Study of Their Optical Properties. **Metody polucheniia dielektricheskikh zerkal i interferentsionnykh svetofiltrov i issledovanie ikh opticheskikh svoistv.** F. A. Korolev and A. Iu. Klementeva. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 65-73.

Description of methods and fields of application.

4486* (Russian.) Magnetostriction Theory in Isotropic Materials. **K teorii magnitostriktsii v isotropnykh materialakh.** G. P. Diakov. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 75-78.

Mathematical analysis.

4487* (German.) The Effective Mass of Electrons in Crystals. **Über die effektive Masse von Elektronen in Kristallen.** W. Martienssen. *Naturwissenschaften*, v. 44, no. 21, Nov. 1957, p. 551-554.

The cyclotron resonating method is used for determining the effective mass of electrons in crystals.

4488* (German.) General Solution of the Layer Problem in Optics. **Eine allgemeine Lösung des Schichtproblems der Optik.** Anton Bigelmaier. *Optica Acta*, v. 4, no. 3, Sept. 1957, p. 81-86.

Explicit formulas are given for the transmission and reflection of a system of plane parallel thin films. Coupling effects arising in various possible arrangements are described by coupling factors.

4489* (German.) Investigations of Telescope Laws. **Untersuchungen zu den Gesetzen des Fernrohrsehens.** H. Köhler and R. Leinhos. *Optica Acta*, v. 4, no. 3, Sept. 1957, p. 88-101.

Visual acuity at low light intensities depends on the magnification and aperture of the instrument.

4490 Optical Diffractometer for Facilitation of X-Ray Diffraction Studies on Macromolecular Structures. Harold W. Wyckoff, Richard S. Bear, Richard S. Morgan, and Diego Carlstrom. *Optical Society of America, Journal*, v. 47, Dec. 1957, p. 1061-1069.

Deals with investigation of helical chain molecules; larger sized structures exhibiting small-angle X-ray diffraction; and image synthesis of centrosymmetric configurations.

4491 Electrodeless Discharge Tubes Containing Rare Earth and Heavy Element Halides. Frank S. Tomkins and Mark Fred. *Optical Society of America, Journal*, v. 47, Dec. 1957, p. 1087-1091.

Tubes were prepared using Nd, Pm, Tb, U, Pu, Np, and Am.

4492 Automatic Correction of Residual Aberrations. Joseph Meiron and H. Michael Loebenstein. *Optical Society of America, Journal*, v. 47, Dec. 1957, p. 1104-1109.

Describes a method for the automatic design of optical systems, programmed on an electronic digital computer.

4493 Some Optical and Stress-Optical Properties of Synthetic Ruby. Joseph Anthony Mandarino. 111 p. 1957. University of Michigan, Ann Arbor. (TS753.R8 M31s Over.)

Pleochroism, which is easily measured and requires only simple, inexpensive equipment, is applied to determination of trace elements.

4494 Optical Absorption Lines of Hydrated Manganous Salts at Low Temperatures. R. Pappalardo. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1397-1414 + 4 plates.

The absorption spectra of the sulfate, chloride, fluosilicate, and ammonium sulfide salts were investigated at 78 and 20 K in the 15,000^{-1} to 30,000 cm^{-1} range.

4495 Specific Heat of Solids at High Temperatures. J. N. Eastabrook. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1415-1426.

The temperature dependence of the specific heat of simple crystals at temperatures well above the Debye temperature is estimated by using, as a simple model, the two-atom anharmonic oscillator.

4496 Thermoelectric Power of Ionic Conducting Crystals. R. E. Howard and A. B. Lidiard. *Philosophical Magazine*, v. 2, ser. 8, Dec. 1957, p. 1462-1467.

Theoretical study using models of Frenkel and Schottky lattice disorder.

4497 Equation of State of Gases and Liquids at Low Temperatures. W. B. Riesenfeld and K. M. Watson. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 518-536.

A quantum-mechanical many-particle perturbation method is applied to the determination of the equation of state. Condensation, mixed phases, critical point, and critical temperature are described.

4498 Effective Magnetic Anisotropy and Magnetostriction of Monocrystals. Philip K. Baltzer. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 580-587.

Effective magnetic anisotropy energies associated with domain theory are derived to second order for cubic crystals. These energies are expressed in terms of intrinsic anisotropy for an undeformed crystal, magnetostriction, and elastic moduli.

4499 Effect of Defects of Spin Interactions in a Simple Cubic Lattice. A. Isihara. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 619-629.

Effects of lattice defects such as foreign atoms or holes on spin-spin interactions in a simple cubic lattice are calculated using the so-called spherical model.

4500 Studies on Some Infrared Stimulable Phosphors. S. P. Keller, J. E. Mapes, and G. Cheroff. *Physical Review*, v. 108, ser. 2, Nov. 1, 1957, p. 663-676.

Physical properties of the two phosphor systems SrS:Ce,Sm, and SrS:Eu,Sm, as well as the base material SrS.

4501 Thermoluminescence of X-Ray-Colored KCl Single Crystals. A. Halperin, A. A. Braner, and E. Alexander. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 928-931.

Twelve glow peaks were obtained in the range from 90 to 600 K. The peaks seem to show regularity with regard to their peak temperatures, spectral emission, and sensitivity to optical bleaching in the *F* band.

4502 Thermal Bleaching of *F* Centers and Its Correlation to Thermoluminescence in X-Ray Colored KCl Crystals. A. A. Braner and A. Halperin. *Physical Review*, v. 108, ser. 2, Nov. 15, 1957, p. 932-936.

A double-Dewar vacuum system, with an effective liquid-air trap close to the crystal inside it, is described. Undisturbed thermal-bleaching curves obtained with this system show no restoration of *F* centers when one warms KCl crystals x-irridiated at liquid-air temperature.

4503 Positive-Ion Bombardment of Germanium and Silicon. Sumner P. Wolsky. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1131-1136.

A very sensitive vacuum microbalance was used to study the sputtering of Ge and Si by argon ion bombardment. Current densities of 1 to 12 μ a/cm^2 were used.

4504 Theory of Ferromagnetic Anisotropy. W. J. Carr, Jr. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1158-1163.

By means of a virial theorem and perturbation theory, the anisotropy energy of a ferromagnetic crystal is expressed in terms of the Coulomb energy alone. This latter energy is approximated by a multipole expansion and the anisotropy constants are given in terms of electric multipole moments and crystalline-potential constants.

4505 Refractive Index of He^4: Saturated Vapor. M. H. Edwards. *Physical Review*, v. 108, ser. 2, Dec. 1, 1957, p. 1243-1245.

Eight absolute measurements from 1.5 to 4.2 K and about 200 other relative measurements in this temperature range are reported, showing that there is no change in the electronic state of the gaseous He molecule between room temperature and 1.5 K.

4506* A Lattice Model of Liquid Helium. III. Equilibrium Properties of Liquid He^4 and Mixtures of He^4 and He^3. Hirotsugu Matsuda. *Progress of Theoretical Physics*, v. 18, Oct. 1957, p. 357-366.

4507* (Russian.) Nickel-Copper Ferrites With a Narrow Resonance Curve of Absorbtion at Super-High Frequencies. **Nikel'-mednye ferrity s uzkoi rezonansnoi krivoi pogloshcheniia na sverkhvysokikh chastotakh.** V. A. Fabrikov, V. D. Kudriavtsev, and Z. M. Gushchina. *Radiotekhnika i Elektronika*, v. 2, no. 10, Oct. 1957, p. 1299-1300.

Development of Ni-Cu ferrite compositions having a very high attenuation ratio corresponding to magnetizing fields of two opposite directions.

4508 Production and Use of High Transient Magnetic Fields. II. H. P. Furth, M. A. Levine, and R. W. Waniek. *Review of Scientific Instruments*, v. 28, Nov. 1957, p. 949-958.

Transient containment of high magnetic energy densities in coils of various geometries. Instrumentation for producing 10 μ sec. range pulses of amplitude up to 1.6 megagauss in single-turn coils.

4509* Precise Measurements of the Density of Mercury at 20 C. I. Absolute Displacement Method. A. H. Cook and N. W. B. Stone. *Royal Society of London, Philosophical Transactions*, v. 250, ser. A, no. 978, Nov. 1957, p. 279-823 + 2 plates.

The densities of four samples of Hg were measured by finding the mass of Hg displaced by an accurately formed cube of known volume that just sinks in Hg. The mean value at 1 atm. pressure is 13.545892 g/cm³.

4510 Mutual Friction in a Heat Current in Liquid Helium II. III. Theory of the Mutual Friction. W. F. Vinen. *Royal Society, Proceedings*, v. 242, ser. A, Nov. 19, 1957, p. 493-515.

The Gorter-Mellink mutual friction force in a heat current is probably associated with turbulence in the superfluid. It is suggested that this turbulence takes the form of a tangled mass of quantized vortex lines, so that the mutual friction probably arises from collisions between thermal excitations and these vortex lines.

4511 (German.) Industrial Application of Ultrasonics. **Ultraschall in der Technik.** H.-J. Martin. *Technik*, v. 12, no. 10, Oct. 1957, p. 669-678.

Mechanical, thermal, and optical effects of ultrasonics. Small wave length, H.F., and great effect on acceleration. Physical, chemical, metallurgical, biological, and medical application on a large scale. Small scale applications.

4512 (German.) The Present State of Infra-Red Spectroscopy. **Der gegenwärtige Stand der Infrarot-Spektroskopie.** R. Ritschl. *Technik*, v. 12, no. 11, Nov. 1957, p. 729-732.

Determining the spectral range from 1 mm. to 1/1000 mm. (1 μ) and the near infra-red from 1 μ to approximately 25 μ. Distribution of block body energy. Infra-red analysis; wavelength and band intensity measurements.

4513* (German.) Manganese-Zinc Ferrites With High Permeability and Small Losses. **Mangan-Zink-Ferrite mit hoher Permeabilität und geringen Verlusten.** W. Heister. *Technische Mitteilungen Krupp*, v. 15, no. 6, Nov. 1957, p. 130-144.

Magnetic, dielectric, metallographic, and electron-microscopic tests are described. The influence of the size of crystals on magnetic properties is analyzed.

4514 X-Ray Crystal Structure. Dan McLachlan, Jr. 416 p. 1957. McGraw-Hill, New York. (QD945 M22x)

Text shows how to determine the atomic positions within a crystalline material, using X-ray data obtained from single crystals. It stresses the theory of space groups, single crystal cameras, Fourier methods, computing devices, and the phase problem.

4515* (German.) Theory of Ferromagnetism. **Zur Theorie des Ferromagnetismus. I.** The Collective Electron Model. **Das Kollektivelektronenmodell. II.** The Heisenberg Model. **Das Heisenberg-Modell.** Klaus Meyer. *Zeitschrift für Naturforschung*, v. 12a, no. 10, Oct. 1957, p. 786-804.

4516* (German.) The Thermoluminescence of Natural Fluorite. **Über die Thermolumineszenz von natürlichem Flusspat.** K. Luchner. *Zeitschrift für Physik*, v. 149, no. 4, 1957, p. 435-452.

The method of glow curves was used to measure the thermal luminescence of a natural fluorite. The device used worked in a relatively wide spectral range as a quanta computer. Interpretation of the individual glow maxima. Changes of the excitation.

4517* (Russian.) The Effect of Magnetic Viscosity on the Frequency Properties of Ferrites. **Vliianie Magnitnoi Viazkosti na ehastotnye svoistva ferritov.** R. V. Telesnin and A. G. Shishkov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 33, no. 4, 1957, p. 839-844.

An investigation of a series of Ni-Zn ferrites under conditions of free and induced variations of magnetization.

4518* (Russian.) The Effect of the He^3 Admixture on the Viscosity of Helium II. **Vliianie primesi He^3 na viazkost' geliia II.** V. N. Zharkov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 33, no. 4, 1957, p. 929-932.

Based on the Landau theory of liquid He, the coefficient of viscosity of a weak solution of He^3 in He II is determined as a function of temperature and concentration.

4519* (Russian.) Surface Ionization of Potassium Atoms and KCL and CsCl Molecules on Tungsten in Electric Fields up to Two Mv/cm. **Poverkhnostnaia ionizatsiia atomov kaliia i molekul KCL i CsCl v elektricheskikh poliakh do 2Mv/cm na vol'frame.** E. Ia. Zandberg. *Zhurnal Teknicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2583-2594.

Investigation of temperature threshold of surface ionization depending on values of electric field strength in a cylindrical capacitor with W filament.

4520* (Russian.) The Polaron Theory in the Case of Arbitrary Strength of the Bond Between the Electron and Optical Vibrations of the Lattice. **Teoriia poliaronov pri ploizvol'noi sile sviazi mezhdu elektronom i opticheskimi kolebaniiami reshetki.** S. I. Pekar and V. M. Buimistrov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2667-2669.

See also: **3263** (Li-Zn ferrites); **3580** (thermal conductivity of He II); **3847** (flow of liquid He II); **3948** (high-temperature thermal conductivity measurement).

PLASTICS

4521 Recent Developments in the Extrusion of Plastics. G. L. Bata. *Canadian Journal of Chemical Engineering*, v. 35, Dec. 1957, p. 159-164.

An operating diagram of practical utility is described and its use is recommended in connection with every-day problems in an extruding plant.

4522 Isotactic Polymers. G. Natta. *Chemistry & Industry*, 1957, no. 47, Nov. 23, p. 1520-1530.

Crystallinity of isotactic polymers, sterospecific processes of catalysis; atactic and block polymers; properties of mixtures of stereoisomers; diolefin stereoisomeric polymers.

4523* (German.) Polymerization of ϵ-Caprolactam by Means of Alkali Carbonates. **Die Polymerisation von ϵ-Caprolactam mit Alkalicarbonaten. II.** Kinetics and Mechanism of Alkali Polymerization of ϵ-Caprolactam. **Über die Kinetik und den Mechanismus der alkalischen Polymerisation des ϵ-Caprolactams.** O. Wichterle and J. Šebenda. *Collection of Czechoslovak Chemical Communications*, v. 22, no. 5, Oct. 1957, p. 1353-1367.

Study of polymerization speed and molecular weight of formed polymer. Explanation of reactive mechanism of actual polymerization by comparing the experimental results obtained with theoretically derived kinetic relationships.

4524 A Concise Guide to Plastics. Herbert R. Simonds. 318 p. 1957. Reinhold Publishing Corp., New York. (TP986.A2 Si56c)

Properties of the commercial plastics; forms of plastics: production and prices; applications; processes; selection; important producers.

4525* (Russian.) The Polymerization and Cyclization of Isobutylene. **O reaktsii polimerizatsii i tsiklizatsii izobutilena.** I. B. Rapoport, R. M. Flid, and K. Lis. *Doklady Akademii Nauk SSSR*, v. 116, no. 2, Sept. 11, 1957, p. 244-247.

Thermodynamic calculations. Effect of temperature on yield and composition of polymerization products; effect of catalyzer regeneration on its activity.

4526 Random Flight Model in the Theory of the Second Virial Coefficient of Polymer Solutions. Andreas C. Albrecht. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1002-1013.

The theory of the second virial coefficient, $A_2(M_2T)$, for dilute polymer solutions is investigated from the point of view, first developed by Zimm, of the Ursell-Mayer-like development in terms which successively represent increasing numbers of contacts between molecular subunits of flexible chain molecules.

4527 Intermolecular Correlation in Light Scattering From Dilute Polymer Solutions. Andreas C. Albrecht. *Journal of Chemical Physics*, v. 27, Nov. 1957, p. 1014-1023.

The effects of intermolecular correlation on light scattered from

flexible chain molecules are considered. The random flight model is treated correctly to the double contact approximation. Two smoothed density models are carried to the same approximation and comparisons are made.

4528 Studies in Copolymerization. R. M. Joshi and S. L. Kapur. *Journal of Scientific & Industrial Research*, v. 16, sec. B, Oct. 1957, p. 441-444.

The influence of alkyl and acyl chain lengths in monomeric esters on their copolymerization reactivity ratios was studied by following the copolymer composition. Some aspects of structure and reactivity are discussed.

4529* (Russian.) Block and Graft Polymers Prepared by the Chemical Method. **Block- i privitye polimery na osnove khimicheskikh metodov.** M. S. Akutin. *Khimicheskaia Nauka i Promyshlennost*, v. 11, no. 5, 1957, p. 585-592.

Four methods for preparation of block polymers, and three methods for preparation of graft polymers.

4530* (Russian.) High Molecular Insoluble Polyelectrolytes (Ion-Exchange Resins). **Vysokomolekuliarnye nerastvorimye polielektrolity (ionoobmennye smoly).** E. B. Trostianskaia and A. B. Pashkov. *Khimicheskaia Nauka i Promyshlennost*, v. 11, no. 5, 1957, p. 593-602.

Surveys the synthesis and use of ion-exchange resins.

4531* (Russian.) Main Problems in the Production of Glass Fiber Reinforced Plastics, and of Large Plastic Articles. **Osnovnye voprosy proizvodstva stekloplastikov i krupnogabaritnykh izdelii.** B. A. Kiselev. *Khimicheskaia Nauka i Promyshlennost*, v. 11, no. 5, 1957, p. 622-629.

Production methods and possible improvements.

4532* (Russian.) Properties of Piperylene Polymers. **Svoistva polimerov piperilena.** I. A. Livshits, S. I. Il'ina, and V. N. Reikh. *Khimicheskaia Promyshlennost'*, 1957, no. 6, Sept., p. 342-346.

Polymerization of piperylene and its copolymerization with monomers; study of the polymers obtained.

4533* (Russian.) Preparations of Resins and Plastics Based on Methylol Derivatives of Melamine and Urea With the Use of Amino Alcohols. **Poluchenie smol i plastmass na osnove metilol'nykh proizvodnykh melamina i mocheviny s primeneniem aminospirtov.** G. S. Petrov and K. V. Lukina. *Khimicheskaia Promyshlennost'*, 1957, no. 6, Sept., p. 349-352.

Synthesis of N-containing resins on the basis of methylol derivatives using amino alcohols, and preparation of plastics from the resins obtained.

4534* (French.) Distribution of the Molecular Masses in High-Pressure Polyethylenes. **Sur la distribution des masses moléculaires dans les polyéthylène "haute pression".** L. Nicolas. *Makromolekulare Chemie*, v. 24, no. 3, 1957, p. 173-204.

Polyethyleneglycol was used in applying the fractionated precipitation process to "high pressure" polyethylenes. Relationship between intrinsic viscosity and molecular mass. Curves of distribution of mol. wts.

4535* (German.) Effect of Concentration of Viscosity in Solutions of Branched and Unbranched Thread Molecules. **Über die Konzentrationsabhängigkeit der Viskosität von Lösungen unverzweigter und verzweigter Fadenmoleküle. I.** Effect of Concentration of Viscosity in Solutions of Unbranched Thread Molecules. **Die Konzentrationsabhängigkeit der Viskösität von Lösungen unverzweigter Fadenmoleküle. II.** Effect of Concentration of Viscosity in Solutions of Branched Thread Molecules. **Der Einfluss der Verzweigung auf die Konzentrationsabhängigkeit der Viskosität von Lösungen verzweigter Fadenmoleküle.** M. Hoffmann. *Makromolekulare Chemie*, v. 24, no. 3, 1957, p. 222-257.

4536 Why Low-Molecular-Weight Polyethylene? Karl F. Koch and Jack Peck. *Modern Plastics*, v. 35, Dec. 1957, p. 109-112.

Flow properties required for molding intricate polyethylene pieces can be closely controlled by adding low-molecular-weight material.

4537 Factors Affecting the Heat Sealing of Polyethylene Film. R. M. Knight and W. U. Funk. *Modern Plastics*, v. 35, Dec. 1957, p. 133 + 4 pages.

Determination of nature and magnitude of various film and operating variables on strength of heat-sealed joints.

4538 Mold Temperature Control—Why and How. Robert W. Clark. *Modern Plastics*, v. 35, Dec. 1957, p. 144 + 3 pages.

Tight dimensional and property tolerances on parts require close control of mold temperature; four plans of circulating-liquid control are compared.

4539 Polyacetal Resin — A New Engineering Material. Gordon M. Kline. *Modern Plastics*, v. 35, Dec. 1957, p. 153 + 8 pages.

This linear, highly crystalline plastic has substantial strength and stiffness even at 240 F; is resistant to almost all organic solvents; exhibits high strain recovery, low creep rates, and excellent wearing qualities.

4540 The Year 1957 in Review. Gordon M. Kline. *Modern Plastics*, v. 35, Jan. 1958, p. 153 + 25 pages.

Plastics; new products; processes; materials. How they fared during 1957.

4541* (German.) Combustibility of Plastic Films. **Über die Brennbarkeit von Plast-Folien.** K. Thinius. *Plaste und Kautschuk*, v. 4, no. 10, Oct. 1957, p. 367-374.

Investigation of cellulose derivatives and films from polymerization and polycondensation products.

4542* (Dutch.) Epoxy Resins and the Production of Epoxy Resin and Glass Laminates. **Epoxyharsen en de vervaardiging van laminates van epoxyhars en glas.** R. Stierli. *Plastica*, v. 10, no. 11, Nov. 1957, p. 806-814.

Advantages of epoxy resins over other resin groups. Araldit resins. Production methods. Properties of epoxy resins reinforced with glass. Effect of the glass fiber content. Applications in pipes, tanks, molds, and car bodies.

4543* (Polish.) Application and Treatment of Polyvinyl Chloride. **Zastosowanie i przerób polichlorku winylu.** W. Schrader. *Przemysł Chemiczny*, v. 13, no. 10, Oct. 1957, p. 562-567.

Properties and application of PVC for construction materials, water pipes, and coatings.

4544 Reinhold Plastics Applications Series. I. Polyethylene. Theodore O. J. Kresser. 217 p. 1957. Reinhold Publishing Corp., New York. (TP986.P6 K88p)

History, basic chemistry, manufacture, and processing. Films and coating application. Use of polyethylene pipe, coated wire, miscellaneous extrusions, moldings, blown bottles, vacuum formings, and pieces made by miscellaneous processes.

4545* Molding, Quality Control and Some Aging Characteristics of Nylon. Stanley R. Prosen. *SPE Journal*, v. 13, Dec. 1957, p. 28-31.

Use of a cold mold and good molding procedures enhances the toughness of nylon molded items and decreases the occurence of brittle failures. A simple quality control test can be used to predict the performance and will discriminate between good and bad nylon as characterized by brittleness.

4546* Molding Thick Sections. Louis Paggi. *SPE Journal*, v. 13, Dec. 1957, p. 48 + 1 page.

Important variables are condition of the plastic, temperature of the plastifying cylinder, rate of filling of the mold, pressure within the cavity, cycle distribution, and gate design.

4547* Extrusion Coloring Natural Polyethylene. H. Segal. *SPE Journal*, v. 13, Dec. 1957, p. 49-50.

Methods for adding color during processing.

4548* (German.) Investigation of High-Polymer Acrylic Derivatives. **Untersuchungen an hochpolymeren Acrylderivaten. III.** Ultra-Violet and Infra-Red Spectrographic Investigation of Polyacrylonitrile and Its Saponification Products. **UV- und UR- spektrographische Untersuchungen an Polyacrylnitril und seinen Verseifungsprodukten.** H. Bayzer and J. Schurz.

Zeitschrift für Physikalische Chemie (Frankfurt), v. 13, nos. 1-2, Oct. 1957, p. 30-39.

Polyacrylonitrile is alkaline-saponified in a heterogeneous manner. The intermediate products, which are brightly colored in yellow to red, are investigated spectrographically.

See also: **3280** (caprolactam polymers); **3388** (determination of Pb stabilizers in PVC); **3632** (flow of plastisols); **3824** (plastic production, 1957-8); **4373** (positron annihilation in Teflon).

POLLUTION AND WASTES

4549 Vital Importance of Industrial Water. Harry I. Riegel. *American Iron and Steel Institute, Preprint*, 1957, 23 p. (TS300 Am35ta Vis.)

Describes the water systems at Kaiser Steel's Fontana plant based on planned re-use of diminishing-quality waters.

4550 Principles of Aeration as Applied to Waste Treatment. W. Wesley Eckenfelder, Jr. *Canadian Journal of Chemical Engineering*, v. 35, Dec. 1957, p. 173-178.

An aeration design procedure is presented for activated sludge units treating industrial wastes.

4551 Cleaner Air for Urban Areas. 69 p. 1957. Franklin Institute Laboratories, Philadelphia. (TD884 F85.4c Over.)

Proceedings of a symposium on the air pollution problem and what is being done about it.

4552 Trends in Air Pollution. Wesley C. L. Hemeon. *Industrial Heating*, v. 24, Nov. 1957, p. 2320 + 3 pages.

A review of recent progress in abatement and control.

4553* Interpretation of Mass Spectra of Condensates From Urban Atmospheres. E. R. Weaver, et al. *Journal of Research, National Bureau of Standards*, v. 59, Dec. 1957, p. 383-404.

If the products from each source are of substantially constant composition it is possible to obtain a representative pattern of each and to proceed thereafter to make a fairly good estimate of the character and amount of pollutants in terms of their sources.

4554 Dust and Fume Control. J. C. Somers. *Mechanical Engineering*, v. 79, Nov. 1957, p. 1022-1024.

How to eliminate industrial dusts, fumes, odors, and toxic conditions from industrial plants.

4555 Radioactive Waste Disposal Report on Seepage Pit Liquid Waste—Shale Column Experiment. William J. Lacy. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2415, Nov. 1957, 21 p. (UF767 U3o Contin.)

Investigates the waste adsorption capacity of Conasauga shale. The liquid waste material used was taken from seepage pits.

4556* Use and Handling of Chemicals in Industrial Waste Treatment. Edmund B. Besselievre. *Sewage and Industrial Wastes*, v. 29, Nov. 1957, p. 1252-1266.

Discusses few of the common chemical compounds used to treat industrial wastes, and points out factors in their economical use and handling that have been incorporated into several major waste projects.

4557* Biochemical Oxygen Demand of Organic Chemicals. Arthur C. E. Oberton and Vernon T. Stack, Jr. *Sewage and Industrial Wastes*, v. 29, Nov. 1957, p. 1267-1272.

Discussing the biological oxidation of organic chemicals, and pointing out the uncertainty of an inflexible analytical procedure.

4558* Activated Sludge Cultures Developed on Pure Organic Compounds. Richard S. Engelbrecht and Ross E. McKinney. *Sewage and Industrial Wastes*, v. 29, Dec. 1957, p. 1350-1362.

The chemical structure of the organic matter fed to activated sludge was found to be the controlling factor in predomination of microorganisms and in the biochemical changes when all environmental factors were consistent.

4559* Toxicity Studies of Metal-Finishing Wastes. W. D. Sheets. *Sewage and Industrial Wastes*, v. 29, Dec. 1957, p. 1380-1384.

Variations in the treatment plant, such as sewage strength, sludge concentration, and character of the activated sludge or the zoogleal growths on the filter, are factors that will affect the toxicity limit.

4560* Application of the Atomized Suspension Technique. W. H. Gauvin. *Tappi*, v. 40, Nov. 1957, p. 866-872.

Method of treating waste liquors consists of atomizing the liquor in the absence of air or other foreign gases into the top of a tower, the walls of which are maintained at a high temperature, and passing the resulting suspension of droplets in the water vapor atmosphere as a carrier through successive zones of evaporation, drying, and chemical treatment, as it proceeds down the tower.

4561* Physical Properties of Neutral Sulphite Spent Liquors. S. T. Han. *Tappi*, v. 40, Nov. 1957, p. 921-926.

Density, viscosity, boiling-point rise, heating value, and chemical characteristics.

4562 A Time of Arrival Indicator for Radioactive Fallout. Ross W. Farmer and Oscar Reiner, Jr. *University of California at Los Angeles, School of Medicine (U. S. Atomic Energy Commission)*, UCLA-413, Nov. 1957, 16 p. (UF767 Un3.1uc Contin.)

Instrument incorporates its own power supply, can be operated unattended for four weeks, is rugged enough to tolerate the treatment normally associated with field operation, and is comparatively inexpensive.

4563* Mesophilic Anaerobic Digestion. II. L. L. Langford. *Water & Sewage Works*, v. 104, Dec. 1957, p. 546-553.

Structural, mechanical, and operational considerations.

See also: **3346** (determination of aromatics in polluted air); **3716** (cyanide waste treatment); **3885** (effects of hydrogen bomb-test); **4074** (recovery of Cr and Cu from pickling liquor); **4594** (disposal of dyeing wastes).

RUBBER AND ELASTOMERS

4564 The Structure of Butadiene Dimers Produced by a Free-Radical Chain-Transfer Mechanism. L. J. Gendron and R. V. V. Nicholls. *Canadian Journal of Chemistry*, v. 35, Dec. 1957, p. 1467-1474.

Butadiene was dimerized using acetyl peroxide as source of free radicals and chloroform as solvent and chain-transfer agent. One dimer was formed only by 1,4-additions and the other only by 1,2-additions. This implies that polybutadienes may be mixtures of two varieties: one variety resulting from 1,4-additions and the other from 1,2-additions.

4565 Chemistry of Natural and Synthetic Rubbers. Harry L. Fisher. 208 p. 1957. Reinhold Publishing Corp., New York. (TS1890 F53c)

History and chemistry of elastomers. Vulcanization, acceleration, antioxidation, and antiozonation. Properties and raw materials. Hard rubber. Bonding rubber to metal. Reclaimed rubber. Chemical derivatives.

4566* (Russian.) Interaction Between Carbon Black and Sulfur in the Rubber Valcanization Process. **O vzaimodeistvii sazhi s seroi v protsesse vulkanizatsii kauchuka.** G. A. Blokh and A. G. Iaroshevich. *Doklady Akademii Nauk SSSR*, v. 116, no. 1, Sept. 1, 1957, p. 105-108.

Kinetics of the interaction between carbon black (gas or lamp black), radiosulfur, and accelerants.

4567 The Nature of the Particle Surface in Hevea Latex and Pastes of Rubber Hydrochloride and Polyvinyl Chloride. G. Schuur. *Journal of Colloid Science*, v. 12, Dec. 1957, p. 538-548.

4568* (German.) The Vulcanization of High-Elastic Polymers. **Zur Kenntnis der Vulkanisation hochelastischer Polymerisate. XVIII.** The Vulcanization of Natural Rubber by Sulfur in the Presence of Mercaptobenzothiazole. **Über die Vulkanisation des Naturkautschuks durch Schwefel in Gegenwart von Mercaptobenzothiazol.** Otto Lorenz and Elisabeth Echte. *Kautschuk und Gummi*, v. 10, no. 11, Nov. 1957, p. WT273-WT277.

Influence of S concentration and the content of ZnO on the kinetics of vulcanization.

4569* (Russian.) Oil Extended Rubber and Its Technical Properties. **Maslianye kauchuki i ikh tekhnicheskie svoistva. I.** Description of the Process of Production of Oil-Extended Rubber "CKC-30AM". **Tekhnologicheskoe oformlenie protsessa polucheniia maslianogo kauchuka CKC-30AM.** A. E. Kalaus, et al. *Khimicheskaia Promyshlennost'*, 1957, no. 6, Sept., p. 333-342.

Production process, materials, and equipment.

4570* (Russian.) Heat-Resistant and Mechanically Strong Polyorganosiloxane Rubbers. **Termostoikie mekhanicheski prochnye poliorganosiloksanovye reziny.** K. A. Andrianov and A. I. Glukhova. *Khimicheskaia Promyshlennost'*, 1957, no. 6, Sept., p. 347-348.

Preparation of block polymers based on organosilicon and other organic polymers, and production of rubber from them.

4571* (German.) X-Ray Investigation of Aged Butadiene-Styrene Polymer. **Röntgenunterschungen an gealterten Butadien-Styrol-Mischpolymerisaten.** M. Dietze. *Plaste und Kautschuk*, v. 4, no. 10, Oct. 1957, p. 387-393.

Aged and non-aged polybutadiene and butadiene-styrene polymers were investigated and the results compared.

4572 Elastomers for Use in Radiation Fields. II. Effect of Gamma Radiation on Heat-Resistant Elastomers. Robert Harrington. *Rubber Age*, v. 82, Dec. 1957, p. 461-470.

Data on physical-property changes of silicones, fluoroelastomers, and isocyanate-urethane elastomers.

4573* Butyl Latex Tire-Cord Adhesives. A. L. Miller and S. B. Robison. *Rubber World*, v. 137, Dec. 1957, p. 397 + 7 pages.

A comprehensive study of tire cord adhesives, their use, and the value of laboratory test results as related to tire performance. Need of further study of the adhesion process is revealed.

4574* (Russian.) The Dependence of Mechanical Properties of Gutta-Percha on the Development of Structure and on the Temperature. **Zavisimost' mekhanicheskikh svoistv guttaperchi ot stepeni strukturirovaniia i temperatury.** T. I. Sogolova, B. I. Aikhodzhaev, and V. A. Kargin. *Zhurnal Fizicheskoi Khimii*, v. 31, no. 10, Oct. 1957, p. 2340-2350.

Mechanical properties in the crystalline and amorphous states. Increased deformability with bound sulfur.

4575* (Russian.) Regularities of Transformation of Work Into Heat With Adiabatic Deformation of Butyl Rubbers. **Zakonomernosti prevrashcheniia roboty v teplo pri adiabaticheskom deformirovanii rezin iz butil-kauchuka.** M. P. Votinov and E. V. Kuvshinskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, no. 11, Nov. 1957, p. 2554-2556.

Investigation of thermoelastic properties by adiabatic expansion which permits examination of the regularity of crystallization during the expansion.

See also: **4600** (rubber threads in textiles).

SPACE HEATING AND CONDITIONING

4576* Commercial and Industrial Finned-Tube Radiation. *Air Conditioning, Heating, and Ventilating*, v. 54, Dec. 1957, p. 71-82.

Specifications for finned-tube radiation components for the perimeter heating of commercial and industrial buildings.

4577* Heat Pump and Heating Cables Installed in the Same Residence for Data Purposes. C. W. Jones and E. E. Linden. *Applications and Industry*, 1957, no. 33, Nov., p. 307-314.

House features two full-capacity systems: a water-to-air heat pump with supplementary resistance heaters; heating cables buried in the ceiling plaster.

4578 A Comparison of Heating Systems in Two Occupied Houses. D. R. Wills and P. R. Chance. *Gas Council, Research Communication* GC42, Nov. 1957, 58 p. (TP700 G21.2r Vis.)

Comparisons were made between warm-air ceiling panels, warm-air convection heating, and flueless background heating, with gas fires for supplementary heating. Different levels of background heating were employed, ranging from a relatively low value to higher levels generally associated with whole-house heating. Finally, the all-gas systems were replaced by coke open fires with large back boilers to enable a comparison between the all-gas and the more conventional solid-fuel systems.

4579 Sun Energy Assistance for Air-Type Heat Pumps. Chester P. Davis, Jr. and Ralph I. Lipper. *Heating, Piping & Air Conditioning*, v. 29, Dec. 1957, p. 123-128.

Solar-energy supplementation with storage has provided a heat-source air-temperature increase ranging between 10 and 20 deg. for the air-source heat pump.

4580 A Dynamic Heat Storage System. T. L. Etherington. *Heating, Piping & Air Conditioning*, v. 29, Dec. 1957, p. 147-151.

System uses the latent heat of fusion of disodium phosphate dodecahydrate. A light mineral oil, mutually insoluble with aqueous disodium phosphate, is pumped through the salt to provide agitation and direct contact heat exchange.

4581 Noise Control Criteria for Buildings. Karl D. Kryter. *Noise Control*, v. 3, Nov. 1957, p. 14-20.

4582* Strength Characteristics of Ice in Contact With Various Kinds of Surfaces. S. G. Eskin, W. E. Fontaine, and O. W. Witzell. *Refrigerating Engineering*, v. 65, Dec. 1957, p. 33 + 6 pages.

Several techniques and pieces of apparatus were integrated to determine the strength of ice and the forces of adhesion between ice and various surfaces. Brass, black and white Teflon, stainless steel, Al, anodized Al, de-icing-lacquer-coated brass, polyethylene, and hardened steel were tested.

4583 Air Conditioning in Aircraft. E. W. Still. *Royal Aeronautical Society, Journal*, v. 61, Nov. 1957, p. 727-755.

General requirements are discussed in the light of the complete system concept considering safety, differential pressure, weight saving, power and air supply, passenger comfort, cooling, and humidity.

4584* (French.) Heat Transfer Through Gas Between Double or Multiple Gas-Tight Glass Panels. **Transmission de chaleur à travers des panneaux étanches doubles ou multiples à remplissage gazeux.** A. Krings and J. Th. Olink. *Silicates Industriels*, v. 22, no. 11, Nov. 1957, p. 595-603.

Internal resistance between two glass panels. Apparent conductivity of vertical air layers. Heat transfer through double slanted glass panes.

See also: **3290** (absorption cooling process); **3295** (20.4 K refrigerator); **3737** (heat transfer in transistors).

TEXTILES, FIBERS, LEATHER, AND PAPER

4585* Impregnation for Water Repellency and Its Logical Use With Synthetic-Resin Finishing. Hans Ruile. *American Dyestuff Reporter*, v. 46, Dec. 16, 1957, p. 947 + 6 pages. (Translated from *Melliand Textilberichte*, Mar. 1957.)

The principles underlying water-repellent impregnation and synthetic-resin finishing as well as their combined effect on the properties of the treated fabric.

4586 The Preparation and Tanning Properties of Phenolic Derivatives of Ligninsulfonic Acid. IV. Tanning With Preparations of Low Molecular Weight. W. R. Kenzie, P. A. Deutsch, and J. Benkö. *American Leather Chemists Association, Journal*, v. 52, Dec. 1957, p. 652-666.

Removal of the ligninsulfonates of high mol. wt. before condensation with phenol resulted in a superior tanning agent. This low molecular condensate was evaluated as solo tanning agent in a countercurrent tanning test.

4587 Tracer Techniques in Fiber Research. Howard J. White, Jr. *Analytical Chemistry*, v. 29, Dec. 1957, p. 1744-1747.

Emphasis is primarily on applications involving textile fibers; some examples involve fibers in paper and biological systems.

4588 The Alkaline Degradation of Polysaccharides. I. Soluble Products of the Action of Sodium Hydroxide on Cellulose. G. N. Richards and H. H. Sephton. **II. The Alkali-Stable Residue From the Action of Sodium Hydroxide on Cellulose.** G. Machell and G. N. Richards. *Chemical Society, Journal*, 1957, Nov., p. 4492-4506.

4589 A Method of Measuring the Molecular Orientation in Filaments of Polyethylene Terephthalate Using Dichroic Dyestuffs. D. Patterson and I. M. Ward. *Faraday Society, Transactions*, v. 53, Nov. 1957, p. 1516-1526 + 1 plate.

4590* A New Approach to the Determination of Fiber Saturation Point From Mechanical Tests. Frederick F. Wangaard. *Forest Products Journal*, v. 7, Nov. 1957, p. 410-416.

Testing the same species by shrinkage and mechanical methods, produces different fiber saturation points not accounted for by variation in material. There is a high degree of correlation between average values and ratios of air-dry to green strength and stiffness. This technique can be applied to determine the mechanical intersection point of a large number of species.

4591* (Russian.) Hydrolysis of Cellulose-Containing Materials Using Small Amounts of Concentrated Sulfuric Acid. **Gidroliz tselliulozosoderzhashchikh materialov malymi kolichestvami kontsentrirovannoi sernoi kisloty.** P. N. Odintsov and I. I. Beinart. *Latvijas PSR Zinātnu Akademija, Vestis*, 1957, no. 9, p. 87-93.

Experiments to decrease the consumption of concentrated H_2SO_4. Simultaneous effect of impact and wear forces in order to improve the movement of small amounts of acid inside the wood particle.

4592* (English.) **On the Peroxide Bleaching of Sulphite Pulp.** Yrjö Hentola, Niilo Hakkarainen, Carita Backlund, and Hannes Sihtola. *Paperi ja Puu*, v. 39, no. 11, 1957, p. 501-508.

Study of a one-stage bleaching process and effect of pre-treatments. There was no brightness increase beyond 6 G. E. units with 1.5% Na_2O_2. Maximum increase was 13-14 G. E. units with 5% of Ua_2O_2. A mild hypochlorite pre-treatment improved results.

4593* (Finnish.) Determining the Volume-Weight of Wood When Using the Method of Submerging in Water. **Puun tilavuuspainon määrittämisestä veteenupotusmenetelmää käyttäen.** Paavo J. Ollinmaa. *Paperi ja Puu*, v. 39, no. 11, 1957, p. 531 + 2 pages.

Comparison of accuracy and reliability of several methods. Use of paraffin for sealing pores.

4594* The Supply, Treatment, and Disposal of Water in the Dyehouse. R. W. Richardson. *Society of Dyers and Colourists, Journal*, v. 73, Nov. 1957, p. 485-491.

4595* Relative Stabilities of Metal Derivatives of *oo*'-Dihydroxyazo Dyes. Fred A. Snavely, W. Conard Fernelius, and Bodie E. Douglas. *Society of Dyers and Colourists, Journal*, v. 73, Nov. 1957, p. 491-495.

Potentiometric measurements in dioxan-water (75:25 by volume).

4596* The Preparation and Properties of Regenerated Cellulose Containing Vinyl Polymers. III. Moisture Relations. G. Landells, J. A. Leathley, and C. S. Whewell. *Society of Dyers and Colourists, Journal*, v. 73, Nov. 1957, p. 496-500.

Large quantities of hydrophobic vinyl polymers deposited inside viscose rayon fibers reduce water imbibition comparatively slightly, but hydrophilic polymers increase the imbibition.

4597* The Swelling and Solution of Synthetic Fibre-Forming Polar Polymers in Liquids. W. R. Moore. *Society of Dyers and Colourists, Journal*, v. 73, Nov. 1957, p. 500-506.

General principles governing the interaction of organic liquids and synthetic fiber-forming polymers. Factors determining whether a liquid will dissolve or swell a given polymer.

4598* (Swedish.) Chemical Modification of Cellulose Fiber Fabrics. **Om kemisk modifiering av cellulosafibervävnader.** Nils Landqvist. *Svensk Kemisk Tidskrift*, v. 69, no. 10, 1957, p. 476-486.

Treatment of cellulose with formaldehyde, epoxy resins, or by acetylation or amination to improve durability and wrinkle-resistance.

4599* (English.) **The Degradation of Cellulose by Aqueous Sodium Hydroxide at 170°.** W. M. Corbett and G. N. Richards. *Svensk Papperstidning*, v. 60, no. 21, Nov. 15, 1957, p. 791-794.

Comparison of the major soluble products from cotton cellulose with those from the progressive stepwise alkaline degradation of hydrocellulose obtained by chain scission of the original cellulose molecules.

4600 The Use of Rubber Threads in Textiles. G. H. Lunge and W. F. Ault. *Textile Institute, Journal (Proceedings)*, v. 48, Nov. 1957, p. P729-P738.

History and principal applications.

4601* Application of Statistical Theory of Elastomers to Supercontracted Keratin Fibers. A. R. Haly and M. Feughelman. *Textile Research Journal*, v. 27, Dec. 1957, p. 919-924.

Supercontraction in LiBr solutions of wool, human hair, and kid mohair takes place in two distinct stages. Evidence is presented which suggests that the polypeptide chains in these fibers, after supercontraction in LiBr solution, reach a condition both at the end of the first contraction stage and at the end of the second stage when the chain segments between positions of cross-linking approximate a random configuration.

4602* Sources of Errors in the Measurement of Yarn Tensile Forces With a Combination of Mechanical and Electronic Components. Lars Waesterberg. *Textile Research Journal*, v. 27, Dec. 1957, p. 925-935.

4603* Thermodynamic Relations Among Stresses, Deformations, and Moisture Absorption. J. W. S. Hearle. *Textile Research Journal*, v. 27, Dec. 1957, p. 940-945.

A new form of the derivation of the relation between moisture absorption, swelling, and applied stresses is given and used to obtain the equations applicable to textile systems. They are strictly valid only under reversible conditions.

4604* The Relationship of Experimentally Evaluated Lateral Order Distribution to the Skin-Core Effect of Viscose Rayon. Y. Tsuda and S. Mukoyama. *Textile Research Journal*, v. 27, Dec. 1957, p. 945-949.

The lateral order distributions of experimental rayons spun in the spinning baths of various compositions are evaluated using the method of fractional dissolution of the methanolized cellulose. They are compared with the skin-core effect of cross section which is characteristic of the structure of viscose rayon.

4605* Physical Properties of Fibers and Yarns of Partially Acetylated Cottons. Rollin S. Orr, Louis C. Weiss, Albert W. Burgis, and James N. Grant. *Textile Research Journal*, v. 27, Dec. 1957, p. 966-975.

4606* (German.) The Reduction of Alkalized Cellulose With Molecular Oxygen. **Über den Abbau von alkalisierter Cellulose mit molekularem Sauerstoff.** Hermann G. Müller. *Textil-Rundschau*, v. 12, no. 11, Nov. 1957, p. 622-635.

A contribution toward solving the problem of reducing damage of the cellulose fiber by applying special alkalization conditions.

See also: **3602** (SO_2-H_2O-CaO system); **3826** (European paper industry statistics); **3914** (paper properties); **4560** (treatment of papermill waste liquor); **4561** (properties of sulfite spent liquor).

WELDING AND JOINING

4607* **Electrical Assembly by Resistance Welding.** *Automation*, v. 4, Dec. 1957, p. 66-70.

Welding continuous strip and individual terminals; dial feed welders; contact tape welding; conductors to battery cases.

4608* (Russian.) Perspectives of the Use of High-Frequency Currents for Metal Welding. **Perspektivy primeneniia tokov vysokoi chastoty dlia svarki metallov.** B. E. Paton and V. K. Lebedev. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 9-18.

Description of processes of welding and beading with the use of induction heating. Surveys fields of application.

4609* (Russian.) Determining the Chemical Composition of Seam Metal Near the Fusion Zone. **Protsessy ustanovleniia khimicheskogo sostava metalla shva vblizi zony splavleniia.** G. L. Petrov. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 19-37.

Mathematical study of mechanical mixing and diffusion in the molten pool bordering the basic metal.

4610* (Russian.) Participation of the Electrode and Basic Metal in Metallurgical Reactions Occurring During the Electro-Slag Process. **Ob uchastii elektrodnogo i osnovnogo metalla v metallurgicheskikh reaktsiiakh pri elektroshlakovom protsesse.** D. A. Dudko and I. N. Rublevskii. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 56-60.

Study of the behavior of Mn, Si, and P as the main admixing components of carbon structural steel. Comparison of the behavior of Mn and Si upon introduction into the joint from either the basic metal or the electrode wire.

4611* (Russian.) Welding of "Ct. 4" and "CXL-1" Steels in Carbon Dioxide Medium. **Svarka v srede uglekislogo gaza stalei CT. 4 i CXL-1.** N. I. Kakhovskii and A. M. Ponizovtsev. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 61-63.

Description of the automatic and semi-automatic welding of the above steels.

4612* (Russian.) The Sizes of Metal Drops During Their Transfer in an Arc. **O razmerakh kapel' metalla pri perenose v duge.** I. I. Frumin. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 64-70.

Study of the distribution of metal in drops during arc welding and beading with various electrodes under two types of fluxes.

4613* (Russian.) Automatic Beading by Strip Electrode. **Avtomaticheskaia naplavka lentochnym elektrodom.** F. A. Khomus'ko. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 71-76.

Study of automatic method of beading under flux using a wide strip electrode.

4614* (Russian.) Automatic Regulation of the Level of Metal Bath During Electro-Slag Welding. **Avtomaticheskoe regulirovanie urovnia metallicheskoi vanny pri elektroshlakovoi svarke.** Iu. D. Gupalo. *Avtomaticheskaia Svarka*, v. 10, no. 5, Sept.-Oct. 1957, p. 77-85.

4615* (Spanish.) The Productivity Factors in Welding. **Los factores de la productividad en la soldadura.** Othmar Schmidt. *Ciencia y Técnica de la Soldadura*, v. 7, no. 38, Sept.-Oct. 1957, 7 p.

A study of production in a machine factory using manual arc welding. Examination of the steels used; calculations; material yields; electrodes; preparation of the work; design; devices used.

4616 (French.) Industrial Glues. **Les colles industrielles.** A. Rivat-Lahousse. 432 p. 1956. Dunod, Paris. (TP968 R52c)

A theoretical and practical guide-book on the production of industrial glues. Adhesion theory and adhesive properties; mechanical resistance; materials and methods. The principal commercial glues; synthetic thermally hardenable resins; thermoplastic resins; rubber-based glues; glues of animal and vegetable origin.

4617* (Russian.) New Synthetic Glues. **Novye sinteticheskie klei.** D. A. Kardashov. *Khimicheskaia Nauka i Promyshlennost*, v. 11, no. 5, 1957, p. 602-612.

Classification of the synthetic glues according to the chemical nature of their main components, and study of each group separately.

4618* **Welding vs Melting.** R. G. LeTourneau. *Machine and Tool Blue Book*, v. 52, Dec. 1957, p. 134-138.

Similar to a squirt welder, the Tourna-melting machine uses a large tube to conduct the wire and a large can to hold the flux.

4619* (Russian.) Determining Residual Voltage in Welding. **K voprosu opredeleniia ostatochnykh napriazhenii pri svarke.** A. A. Molodozhnikov. *Moscow Universitet Vestnik. Seriia Matematiki, Mekhaniki, Astronomii, Fiziki, Khimii*, v. 12, no. 3, 1957, p. 31-38.

Problems in the case of a cylindrical pipe welded on its cross sectional perimeter, and a plate with a circular opening, in which a round solid disc was welded.

4620* (German.) Influence of Chemical Composition and Structural Constitution on Behavior of Hydrogen in Steel. A Contribution to the Weldability of Killed and Rimmed Carbon Steel. **Einfluss der chemischen Zusammensetzung und des Gefügeaufbaus auf das Wasserstoffverhalten in Eisen und Stahl.** Friedrich Erdmann-Jesnitzer and Paul Dammköhler. *Neue Hütte*, v. 2, no. 10, Oct. 1957, p. 637-645.

4621* (German.) The Metallurgy of Submerged Arc Welding. **Zur Metallurgie der Unterpulverschweissung.** M. Komers. *Schweisstechnik*, v. 11, no. 9, Sept. 1957, p. 97-100.

Development's in submerged arc welding are reviewed; metallurgical processes are analyzed.

4622 (Swedish.) The Systematic Application of Automatic Welding in Welding Shops. **Automatsvetsning som Rationaliseringsåtgärd vid svetsverkstäder.** Göran Almqvist. *Svetsaren*, v. 22, no. 2, 1957, p. 25-30.

Automatic welding theory. Overheating risk compared with hand welding. Application to high production welding methods. Current density and intensity vs. welding rate.

4623* **Ultrasonic Welding.** T. W. Black. *Tool Engineer*, v. 39, Dec. 1957, p. 111-113.

Welding with ultrasonic vibration has now reached the production stage. Foils and thin sheets of Al, Cu, stainless steel, and many other metals can be bonded at high speeds.

4624 Heat-Exchanger Fabrication. P. Patriarca, G. M. Slaughter, and W. D. Manly. *Welding Journal*, v. 36, Dec. 1957, p. 1172-1178.

Welding and brazing procedures used in the fabrication of Ni-base alloy heat exchangers for elevated-temperature service.

4625 Experimental Welding With the Cone Arc. R. E. Monroe and D. C. Martin. *Welding Journal*, v. 36, Dec. 1957, p. 518s-520s.

Many of the electrical characteristics of the cone-arc welding process were studied during a program to develop welded Mo heat exchangers containing tube-to-header-joints. Production of uniform welds was primarily a function of even heat transfer around the weld periphery. A modified theory is presented to explain the cone-arc process.

4626 Selection of Welding-Rod Chemical Composition Through Mathematics. G. H. Bohn. *Welding Journal*, v. 36, Dec. 1957, p. 541s-549s.

A procedure for determining the most satisfactory chemical composition for the Cu-Si-Mn-Fe alloy welding rod is proposed.

4627* (German and French.) The Present State and Further Development of Electric Arc Welding of Steel. **Der heutige Stand und die Weiterentwicklung der elektrischen Lichtbogenschweissung von Stahl.** E. Folkhard. *Zeitschrift für Schweisstechnik*, v. 47, no. 7, July 1957, p. 164-169.

A qualitative study of the different welding processes, especially as regards the strength of welded structures. Requirements for a quality electrode. Effects of coating materials on O content of weld. Relationship between the O, Mn, and Si content in welds made with coated electrodes. (To be continued.)

See also **3697** (measurement of spot weld current); **3967** (design of welded structures); **4035** (corrosion of Al-Mg welds); **4103** (stress-relief of welded plate); **4116** (assessment of spot-weld ductility); **4162** (cylinder warpage from welding); **4170** (weld heat-affected zone of T-1 steel); **4205** (structure of welds in austenitic steel); **4260** (Ni-B brazing-alloy phase diagram); **4282** (ultrasonic weld inspection); **4284** (X-ray measurement of stresses in welds).

MISCELLANEOUS

4628 Development of New Products and Processes. Morrough P. O'Brien. *American Iron and Steel Institute, Preprint*, 1957, 15 p. (TS300 Am35ta Vis.)

Describes and exemplifies the "climate" conducive to fruitful research effort.

4629* Seasonal Adjustments by Electronic Computer Methods. Julius Shiskin and Harry Eisenpress. *American Statistical Association, Journal*, v. 52, Dec. 1957, p. 415-449.

The present electronic computer methods for seasonally adjusting economic time series in census computations generally yield results of at least the same order of quality as the best clerical methods.

4630 Experimental Designs. William G. Cochran and Gertrude M. Cox. 2nd Ed. 616 p. 1957. John Wiley & Sons, New York. (QA276 C64e2)

Plans of various useful types of designs for experiments, showing the kind of work for which each design is appropriate, and giving illustrations of its practical use.

4631 The Federal Lands: Their Use and Management. Marion Clawson and Burnell Held. 501 p. 1957. Johns Hopkins Press, Baltimore. (HD216 C57f)

An analysis of past and present federal land management practices, with emphasis on recent major changes and what they mean for the future. Includes data on revenue and expenditures.

4632 The Nation's Need for Greater Scientific and Technical Strength—Means for Its Attainment. Mervin J. Kelly. *Institute of Radio Engineers, Transactions on Engineering Management*, v. EM-4, Dec. 1957, p. 122-127. (TK1 In6.6em Vis.)

The importance of technical strength to American culture is emphasized. Some pertinent statistics of U. S. development along with growing threats help emphasize need for more and better technological growth.

4633 Safety and Relief Valves. Fred D. Marton and Chester S. Beard. *Instruments and Automation*, v. 30, Dec. 1957, p. 2249-2254.

Types of pressure-relieving devices; safety codes; valve design and applications; back pressure; high-temperature operation.

4634 Inventions Wanted by the Armed Forces. 34 p. 1957. U. S. Department of Commerce, Washington, D. C. (T212 Un3.4i)

Lists 380 technical problems affecting the defense of the U. S.

4635 Lives in Science. 274 p. 1957. Simon and Schuster, New York. (Q141 Sci27L)

Brief biographies of Galileo, Isaac Newton, Robert Hooke, Laplace, William Rowan Hamilton, G. F. Fitzgerald, Priestly, Lavoisier, Ben Franklin, Faraday, Joseph Henry, James Clerk Maxwell, William Harvey, Darwin, Pavlov, Charles Babbage, Lewis Carroll, and Srinivasa Ramanujan.

4636 Liquid Metals for Industrial Heating and Cooling. I. Frank H. Slade. *Machinery Lloyd (Overseas Ed.)*, v. 29, Nov. 9, 1957, p. 96 + 4 pages.

Comparative essay on application of Na, Hg, Pb, Pb-Bi, and NaK for various technical purposes.

4637 Man and His Thermal Environment. *Mechanical Engineering*, v. 79, Nov. 1957, p. 1029-1036.

Considers factors in heat stress, reaction to extreme heat and extreme cold, exposure to infra-red radiation, and histolic studies of burns.

4638 The Numerical Solution of Two-Point Boundary Problems in Ordinary Differential Equations. L. Fox. 371 p. 1957. Oxford University Press, London. (QA371 F83n)

Describes various boundary-value methods for differential systems of order one to four, including problems of eigen-value type. Both linear and non-linear cases are considered, and special attention is given to the proper numerical treatment of the various possible types of boundary conditions.

4639 Disaster Planning. Special Report. *Petroleum Refiner*, v. 36, Dec. 1957, p. 101-120.

The eight most vital areas of disaster planning are: organization, responsibilities, procedures, training, mutual aid, communications, transportation, and public relations.

4640 Proceedings of the 43rd Annual Road School. Ben H. Petty. *Purdue University, Engineering Bulletin, Engineering Extension Dept., Extension Series No.* 92, v. 41, Sept. 1957, 221 p. (TE1 P97.6p Vis.)

Miscellaneous papers on highway engineering practices, highway construction and laws, soil stabilization, and traffic engineering.

4641* Tack of Pressure-Sensitive Tape. Franklin S. C. Chang. *Rubber Chemistry and Technology*, v. 30, July-Sept. 1957, p. 847-853.

New method for measuring tack. Since tack is defined to be free of added pressure and depression effect, this explains the independence of tack and dependence of adhesion strength on stiffness of paper. Thus, tack may be the limiting value of adhesion strength.

4642* Standard Industrial Classification Manual. 433 p. 1957. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (HC102 Un3.7s Ref.)

Both manufacturing and non-manufacturing establishments are classified according to the type of activity in which they are engaged.

4643* (Russian.) Certain Types of Random Fields in *n*-Dimensional Space Similar to Stationary Stochastic Processes. **Nekotorye klassy sluchainykh polei v *n*-mernom prostranstve, rodstvennye statsionarnym sluchainym protsessam.** A. M. Iaglom. *Teoriia Veroiatnostei i ee Primeneniia*, v. 2, no. 3, 1957, p. 292-338.

Establishes a spectral theory for certain types of random fields and random generalized fields (multidimensional random distributions) in Euclidian space similar to the well-known spectral theory for stationary random processes.

4644 The Numerical Solution of the Time-Dependent Transport Equation in Finite Cylindrical Geometry. Joseph Fleck. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4940, Aug. 1957, 27 p. (UF767 U3u Contin.)

A system of finite difference equations is derived from the time-dependent transport equation for solving problems in finite right cylindrical geometry. The equations are likewise applicable to any azimuthally symmetric geometry.